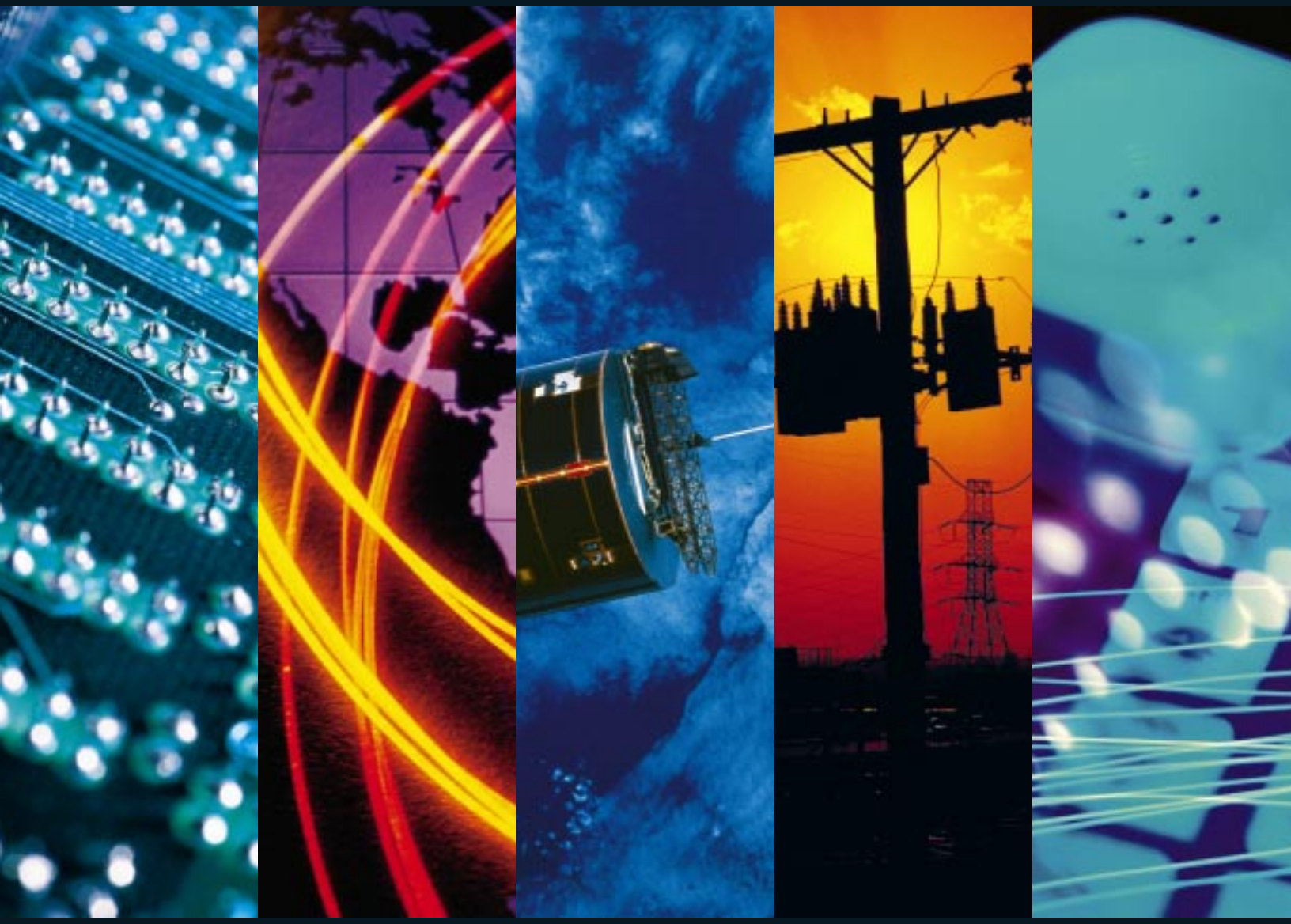
The Federal Communications Commission
in conjunction with
The Network Reliability & Interoperability Council

Y2K Communications Sector Report

March 1999



www.fcc.gov/year2000

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Communications Sector Report

March 1999

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ACKNOWLEDGEMENTS

We would like to thank the following people for their contributions to the national effort to address the problems posed to the communications industry by the Year 2000 date-rollover:

- **FCC Chairman William Kennard and Commissioners Susan Ness, Harold Furchtgott-Roth and Gloria Tristani, for their support, encouragement, and commitment of time and resources.**
- **Participants in the Network Reliability and Interoperability Council.**
- **GSA Commissioner Dennis Fischer, Co-Chair, and the Members of the Telecom Sector Working Group of the President's Council on Year 2000 Conversion.**

And special thanks to the Members of the FCC Y2K Task Force — for their commitment to providing to the public the best information and resources available on communications and Y2K, and for their hard work on this report. (Names are listed in alphabetical order.)

Alan Barna	**Ruby Hough**	**Leslie Selzer**
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Executive Summary

Introduction

We are pleased to report on the status of Y2K remediation in the communications industry. This report covers five industry sectors: wireline telephone, wireless telephone, cable television, broadcast telelvision and radio, and satellite. In addition, we have special sections dedicated to the international telephone network and emergency services.

Perhaps of all of these networks, the most critical to the nation is the wireline telephone network. Telephone companies around the world provide critical services to their customers. Whether it is completing an emergency phone call or transferring trillions of dollars in electronic fund transactions, we rely upon the telephone network to operate smoothly and seamlessly. As we approach the millennium, it is imperative that all aspects of the telephone network, as well as all communications systems upon which we rely, are reviewed for problems stemming from the "date-rollover" problem or "Y2K." The goal of this Report is to help define the problems posed to communications companies and consumers by the Year 2000 date rollover, to explore how pervasive those problems are, and to identify industry progress in addressing those problems.

Simply put, the Y2K problem is caused by a "shortcut" used in many computers and microchips to conserve memory space. In order to conserve scarce memory, programmers used two digits to reflect the year. For example, the year 1972 would be stored as "72." As a result, computers, microchips, and software that use a two-digit year are at risk of recognizing "00" as the year 1900 and not the year 2000. If a program is set to act in a certain way, at a certain time, and it thinks that it is the year 1900, it may perform incorrectly or stop working altogether.

The telephone network is vast and complex. Many different companies own and operate different parts of the network and must work together to complete a call from point A to point B. Any single call could employ telephone, wireless telephone and satellite services. To transmit each and every call, automated and intelligent machines and systems make calculations for the most efficient path to take, out of seemingly limitless combination of services and operators. To provide this robustness the network necessarily consists of millions of interconnected parts and hundreds of million of lines of computer code. Each of these must be checked for possible Year 2000 problems.

As daunting as the challenges may appear, the telecommunications industry is probably better equipped to address and resolve Y2K problems than most. In support of this proposition, we note five fundamental points about this industry.

- This complex industry is engineered for near unfailing reliability. Its success is measured by its ability to complete a call 24 hours a day, 7 days a week, and it meets this high standard with almost unfailing regularity.
- In order to maintain this reliability, telecommunications companies have a strong stable of experienced experts trained in network reliability issues.
- There are telecommunications trade associations and consortiums that have a long history of developing standards and addressing network issues and then sharing their findings among industry members.
- Telephone companies have extensive contingency plans to deal with natural and other disasters, and thus are well positioned for retooling these plans for Year 2000 problems.
- Most Americans receive telephone service from just a handful of very large carriers that

have extensive Y2K plans in place. As a result, we believe the telecommunications industry can bring the kind of experience and resources to this problem that are needed to minimize the impact of Y2K on the telephone network.

It is important to remember, however, that the telephone network constitutes only a part of the communications industry. Cable television, broadcast television, and radio are also important communications resources. This report also looks at the Y2K issues challenging those industries and how they are progressing

Our Three-Dimensional Approach

Y2K is first and foremost a business problem. Reviewing systems for Y2K problems and fixing them is something every business must do for itself. However, the Federal Communications Commission is the government agency that is responsible for overseeing the communications industry and, as such, plays an important role. The FCC has adopted a three-dimensional approach to addressing the problem.

1. Outreach and Advocacy

The first dimension is outreach and advocacy. Through speeches, articles in periodicals, letters to companies and governments, and public forums, the FCC has sought to raise awareness about the Y2K problem and to encourage action. Through tools such as our web page we have endeavored to provide companies with both information and resources for addressing the Y2K problem.

2. Monitoring and Assessment

The second dimension is monitoring and assessment. Through surveys, forums, meetings with the industry, information sharing with industry associations and public sources, such as congressional testimony by industry members, the FCC has been monitoring the industries' efforts to get ready.

3. Contingency Planning and Regulation

The third dimension is contingency planning and regulation. We not only have been monitoring efforts at contingency planning, but also have been trying to provide information and promote the adoption of contingency plans. Even if all steps are taken to fix the "foreseeable" Y2K problems, it is still prudent to plan for the unexpected. We also have reviewed ways to promote industry preparedness through regulatory means, such as highlighting the rules and obligations with which carriers and others will have to continue to comply even during the date-rollover.

Methodology and Information Sources

In order to assess the Y2K-readiness of the communications industry, the FCC has employed a variety of methods and sources. We have issued voluntary and mandatory surveys. A copy of the most recent survey sent to the wireline industry can be found as an attachment on page 103. But our assessment is also based upon other sources, such as the twelve public and private forums held with members of the industry. In addition, we have worked extensively with industry umbrella groups and we have relied extensively on the work of the Network Reliability and Interoperability Council (NRIC), a broad-based federal advisory group that was chartered to advise the Commission on network reliability issues, including Y2K. We also have incorporated public sources, including statements made by companies, users, consumers, and others involved with the communications industry.

Most companies addressing the Year 2000 problem have devised a process for finding Y2K problems throughout their systems and for methodically remediating those systems. First, equipment types are usually broken down into categories or subsystems. Communications systems can be broken down into three major subsystems: (1) network elements, (2) support systems, and (3) auxiliary systems. Each of these subsystems is then reviewed using a step-by-step process aimed at minimizing the possibility that any part of the business will go unexamined. The process used by many businesses includes the following steps:

- Inventory
- Assessment
- Remediation
- Unit Testing
- System or Integration Testing
- Rollout

As a result, our survey measured readiness by asking companies to respond with information on how far along they were in each of these steps. This report includes these survey responses on an aggregated basis, broken down by industry.

Consumer Tips

Each of the industry sections included in this report concludes with a series of recommendations directed at consumers of communications services. It is our hope that these tips will provide guidance on reasonable steps that consumers could take to minimize any impact that a potential Y2K disruption (or even non-Y2K events) might have on their lives. Although we believe that the majority of consumers will not need to rely on any of the recommendations included herein, contingency planning is an important part of Y2K readiness.

Our General Assessment

Wireline

Our analysis of the public telephone network indicates that the largest local and long distance carriers are well on their way to being ready for Year 2000. These carriers are expected to be 100 percent ready, including having their contingency plans in place, by the second quarter of 1999. The seven largest local exchange carriers control approximately 92 percent of all U.S. access lines and the largest long distance companies account for 82 percent of total U.S. long distance revenues.

The remaining carriers, which we define as medium/small, lag behind the large carriers in their remediation and contingency planning efforts and nearly half of the medium/small carriers surveyed by the Commission reported not having formal processes for managing Year 2000. These findings are of concern to us. We are particularly concerned that a large proportion of medium/small carriers appear to lack formal remediation and contingency plans and, therefore, may not be taking the necessary steps to become Year 2000-ready.

We are encouraged by the testing results of the Telco Year 2000 Forum, an industry group comprised of seven of the largest local carriers. The Telco Forum spent six months testing system interoperability and found only six anomalies. The Alliance for Telecommunications Industry Solutions (ATIS) has been conducting intercarrier interoperability testing, and results of that testing should be released in April.

Telephone companies, however, are responsible for remediating only public networks; they are not directly responsible for customer equipment, such as telephones and fax machines, or private internal networks. Owners, such as residential customers and businesses, are responsible for ensuring that their own equipment and software are Year 2000-compliant. If this equipment does not work, consumers will not be able to access the telephone network even if the network experiences no Y2K-related problems.

Wireless

According to the industry, wireless handsets have very few Y2K problems associated with them. If a wireless communications system is integrated into a computer system, however, it should be reviewed for Y2K-related problems. The Commission's survey of wireless carriers revealed a large gap between the preparedness of very large companies and smaller wireless companies. Only about half of the operators serving less than a half-million customers have implemented a remedial plan or process, while large operators have completed almost 60 percent of their fixes. These results are based on composite survey responses that include specifically targeted major commercial operators supplemented with a random sampling from wireless licensees.

The response rate to this survey was disappointingly low, with only approximately 31 percent of those surveyed responding. As a result, we must associate some degree of risk with this industry because we do not know the status of so many of the carriers. We do note, however, that the respondents collectively serve over 42 million of the total 108.3 million wireless subscribers reported in the Commission's most recent wireless competition report.

Broadcast Television and Radio

According to our assessment, the American public should continue to have access to critical news, emergency information and entertainment services on January 1, 2000. Individual Y2K-related disruptions should be isolated. Because virtually all listeners and viewers have several free, over-the-air signals available, service outages that may occur likely will leave affected viewers and listeners with several other alternative broadcast stations to rely on.

Many broadcasters indicate that they have adopted a formal plan to address Y2K. These owners account for a majority of the stations represented in the assessment. The assessment revealed that these broadcasters were largely aware of the Y2K problem and are taking steps to address it. Many broadcasters expect to complete with their Y2K remediation plans in the first half of this year, with ample time for any additional testing or correction prior to January 1, 2000.

Those broadcasters who do not have formal plans also appear to be taking steps to ensure the continuation of service on January 1, 2000. These steps include contacting vendors and performing system integration testing designed to reveal any Y2K-related problems in mission-critical and other station equipment. However, the lack of a formal remediation plan is a concern and makes it difficult to know how far along in the process these broadcasters really are.

Cable Television

According to our survey results, Y2K problems are not likely to cripple cable system operations and it appears that the vast majority of the nation's 65 million cable subscribers will continue to receive a substantial level of cable television service on January 1, 2000. However, a cable system delivers a multitude of video channels,

received from a variety of sources. As a result, isolated channel outages and limited problems may be encountered.

Sixty percent of the respondents to the FCC's survey have implemented a formal Y2K remediation plan or process, while most of the remaining respondents indicate that they are addressing Y2K concerns as they arise or as part of regularly scheduled system monitoring and upgrades. Our survey indicates that large- and medium-size cable operators plan to complete repairs and unit testing by the summer of 1999. We note, however, the limited interoperability testing that has been conducted to date. Our survey also indicates that many small operators have testing and rollout dates that extend through December 1999, leaving little margin of error for unforeseen trouble or unexpected test results.

In addition, small operator respondents indicate that they sometimes lack necessary access to Y2K information, vendors, personnel and financial resources. However, small operators, on average, report that they are close to concluding their risk assessment and expect to complete contingency planning by July 1999. Ironically, some small cable operators are also fortunate to have older equipment that is not date or time sensitive and therefore not susceptible to Y2K problems.

Satellite and High Frequency Broadcasts

With regard to the satellite industry, the industry consesus is that Y2K problems are unlikely to affect satellites now in orbit. The FCC contacted 32 operators and received 28 submissions, but only 12 of the submissions included complete sets of data. The mediocre response rate to this survey does not, in and of itself, indicate a lack of Y2K preparedness. In fact, many of the companies that responded have stated that they regard themselves to be Y2K-compliant in most respects. However, without more specific information, we must assign a certain amount of risk to this industry.

High Frequency (HF) broadcasting, also known as Shortwave Broadcasting, is an international service where transmissions are intended to be received by the general public in foreign countries. HF Broadcasters are licensed by the FCC to operate between 5,950 kHz and 26,100 kHz. In response to the FCC's survey, a majority of HF broadcasters, representing both large and small stations, indicated that most HF licensees are scheduled to be Y2K-compliant before the millennial rollover. The data provided in these submissions support a guardedly optimistic assessment of HF broadcast stations' Year 2000 readiness.

International

Because global telecommunications rely upon seamless interconnection of various domestic and foreign networks, the international dimensions of the Y2K problem are especially significant. Although U.S. telecommunications companies appear to be working diligently to prevent any Y2K disruptions, the international picture is less certain and the FCC remains concerned about whether enough is being done on a global basis to ensure that there are no significant network disruptions or failures.

NRIC conducted an assessment of international telecommunications readiness, which covered 84 of the 225 countries in the world. The NRIC assessment study, a partial snapshot of the global Year 2000 problem, reported that the countries facing a "high risk" of network problems tend to be countries with lower "teledensity," and thus lower dependence on telecommunications services. It categorized the regions of Central and South America, the Indian Sub-Continent, and Sub-Sahara Africa as high risk. The regions of North America, Asia Pacific and Western Europe were categorized as low-to-medium risk. Moreover, the International Telecommunication Union prepared an assessment of its member-countries and private sector participants.

Recent survey results found that 52 percent of 304 respondents who supplied specific dates expected to be Y2K-compliant by March 1999. The remaining percentage of respondents said they would be compliant by the end of this year.

Emergency Services

Emergency services are critical to life and safety. Emergency service communications are made up of a collection of different services, including 911 calls, dispatch services, wireless communications to response teams, and the Emergency Alert System. Telephone companies have been remediating their 911 systems as part of their Y2K programs. In that regard, the Telco Year 2000 Forum's tests of 911 have revealed no failures or anomalies associated with Y2K. Dispatch centers or Public Safety Answering Points are extremely important to emergency service call processing. Local communities own these systems and must take the steps necessary to prepare these systems for Y2K. As for the wireless systems that are used to reach emergency response teams, manufacturers report that conventional systems are not date sensitive and therefore not typically at direct risk for Y2K-related problems. However, if a cellular phone system uses computer switching, it may be at greater risk.

The Emergency Alert System (EAS) is another important element of emergency communications. All broadcast stations and cable systems must participate in EAS. Vendors of EAS equipment indicate that their equipment is compliant or that they have compliant versions available. Cable operators and broadcasters responding to the survey are addressing EAS as part of their overall remediation process.

Conclusion

We are encouraged by the progress being made by the larger companies to prepare for the year 2000, and are cautiously optimistic about the ability of these companies to withstand even unforeseen problems with minimum disruptions to the services they provide. It is important to remember that in many industries, these large companies serve the vast majority of consumers. For example, over 92 percent of people receive phone service from just 7 local telephone carriers, and the top 20 local telephone companies serve over 97 percent of U.S. customers. And while these large telephone companies cannot guarantee that customers will have no Y2K-related problems, we generally concur with their assessment that for most of their customers phone service disruptions will be minor and remedied quickly.

We remain concerned, however, about the smaller companies. Many of the small- and medium-size companies that have adopted a systematic approach to addressing Year 2000 have completion deadlines dangerously close to millennium rollover, leaving little time for delays from vendors or remediation as a result of problems discovered in the testing process. And whether in telephone, cable, broadcast or wireless, many small companies have not adopted a systematic approach to addressing Y2K, an approach that we believe is necessary to adequately address the problem.

INTRODUCTION

The Year 2000 Date Conversion Problem demonstrates to all of us, in a clear and unequivocal way, the level of dependence that we have on the modern day telecommunications industry and the complexity of those systems. Users of communications services throughout the country and the world transmit voice, data and video information upon the telecommunications infrastructure that is composed of wireline networks, wireless systems, and satellite constellations.

The communications infrastructure is one of a handful of basic building blocks upon which all other industries and programs rely. For example, critical programs, such as the Federal Reserve electronic fund transfers and Medicare benefit payments, depend upon the public switched telephone network and, consequently, could be seriously affected if Year 2000 conversion problems interrupt telephone and data networking services. Senator Bennett, Chairman of the Senate Special Committee on the Year 2000 Technology Problem, correctly referred to the global telecommunications infrastructure as "the central nervous system of modern society."

The Year 2000 date problem poses a threat to this nervous system. The problem is caused by a "shortcut" used in many computers and microchips. Years ago, to conserve memory space, programmers used two numbers to record the year — for example, the year 1972 would be stored as "72." While many programmers realized that this convention would not work after 1999, they assumed that the software they were writing would be obsolete and replaced long before the Year 2000 problem became serious. Unfortunately, they were wrong. Computers, microchips, and software that still use a two-digit year are at risk of recognizing "00" not as the year 2000 but as the year 1900. This could cause them to malfunction, leading to less than optimal network performance.

This Report is an assessment of the readiness of the telecommunications industry as of January 1999. It is comprised of data collected by the Commission and the Network Reliability and Interoperability Council (NRIC). The substantive areas addressed include the wireline networks, wireless services, satellite services and international communications. It is important to remember, however, that cable television, broadcast television and radio are also important communications resources upon which people rely. This report also includes an assessment of those industries.

THE TELEPHONE NETWORK IS VAST AND COMPLEX

It is important to remember that no single entity owns or controls the public switched telephone network. The major U.S. telecommunications carriers, such as the Bell Operating Companies, GTE, AT&T, MCI WorldCom and Sprint, provide service to the majority of the country. But 1,300 small to midsize independent telephone companies serve many rural and insular parts of the country as well as the U.S. territories and possessions. Moreover, the total global network depends as well on different international carriers, in different countries around the world. These companies are only one in a long chain of vertically and horizontally integrated companies required for the network to operate.

For example, in order to fix the Year 2000 problem, carriers rely on manufacturers of central office switches and other network equipment, like Nortel Networks, Lucent and Siemens. In addition, private networks and end users, including both large companies and small firms, must make sure that their equipment — such as their tele-

phones and voice mail systems are Year 2000 ready, otherwise, they may be unable to send or receive voice and data traffic even if the local telephone company is up and running.

Without a doubt, the telecommunications network is a tremendously complex and interdependent thing. It consists of millions of interconnected parts and hundreds of millions of lines of computer code. The public switched telephone network processes millions of calls per minute. To transit each and every call, automated and intelligent machines and systems (in the possession of the thousands of telecommunications carriers and users described above) make calculations for the most efficient multi-path, real-time interaction of all points along the established circuit between the call's origination and destination. In micro-seconds, a phone call from Washington, D.C. to New York travels from your telephone to the switchboard in your building, to the local telephone carrier's central office switch, through the carrier's network components and systems that route your call to a long distance carrier (or carriers), through long distance trunk lines (or other telecommunications facilities like microwave, satellite, fiber optic), to another local telephone carrier's central switch, and ultimately to the telephone on the other end. Make the same call two minutes later and the call may be routed in a completely different manner as calculated by the network.

The foregoing description points to the mathematical difficulty of testing the entire public telephone network for Year 2000-readiness. C. Michael Armstrong, chairman and CEO of AT&T, commented that AT&T found that testing every potentially vulnerable system in the AT&T network would require 60,000 test years to complete. If any one of those components or systems is affected by the Year 2000 Problem, a call might be disrupted.

Unique Advantages

As daunting as the challenges and complexity may appear, the telecommunications industry is probably better equipped and positioned to address Y2K than most. In support of this propostion, we note the following five fundamental points about this industry:

First, the telecommunications industry is dependent upon a highly complex, technical network that is engineered for near unfailing reliability. Telecommunications is not an industry that contemplates periods of downtime (e.g., evenings, weekends, holidays, or re-tooling cycles). Telecommunications, quite apart from other industries, is both a "live" network running 24 hours a day, 365 days a year, and an industry sector that is vast yet relies upon a shared infrastructure. And, the success of the industry is measured by how many calls are completed in a timely and reliable fashion.

Success is also measured in terms of revenues, subscribership, dividends, and profits. The major telecommunications carriers and providers understand well that they potentially face diminished goodwill, regulatory trouble, and legal liability if they do not satisfactorily address the Year 2000 problem. Let us not forget that the industry is also susceptible to financial ruin. For example, in the case of PanAmSat's Galaxy IV, which experienced a significant disruption when it spun out of control in 1998, the satellite's failure foreclosed any possibility of the company (a publicly traded subsidiary of Hughes Electronics), at worst, collecting an estimated $78 million in revenues for 1998, and reportedly could lead to a $20 million revenue shortfall in both 1998 and 1999 from the loss of all pre-empted users of the newer Galaxy VI satellite.

Second, the aforementioned legacy of reliability and continuity is evidence that telecommunications companies have a strong stable of experienced experts trained

in network reliability issues. They have experience with identifying threats to network reliability, planning corrections and executing those corrections. They have faced similar network challeges before — they successfully pulled the entire network apart during the AT&T divestiture and implemented toll-free 800 number portability and local number portability. Perhaps the most analogous example of the industry quickly reconfiguring the live network to remedy a "number" issue was when, due to the depletion of the country's telephone number pool, the industry added the three-digit area code.

Third, because of the importance of telecommunications network reliability, continuity, interconnectivity and interoperability, there are a number of first class technical consortiums and prominent trade organizations that have a long history of developing standards and addressing network issues and then sharing those findings with all their members. Telcordia Technologies, Inc., formerly Bellcore, has a long history of serving in this role for the phone system. The Telco Year 2000 Forum, the Alliance for Telecommunications Industry Solutions (ATIS), and other industry groups are providing valuable assistance in facilitating information sharing, building private partnerships and coordinating testing and contingency planning.

Fourth, most telecommunications firms have well-established contingency plans and continuity of operations procedures for potential non-Year 2000 related disruption scenarios. The industry also has established mutual assistance procedures in the event of a particularly debilitating failure where competitors will assist each other by carrying the affected carrier or provider's voice, data or video traffic on their excess capacity. These plans and procedures are being specifically modified for the Year 2000 Problem. Given the ultimate importance of contingency preparedness, the fact that such plans and procedures exist in some form or another will greatly contribute to the industry's ability to react to any potential Year 2000 incident.

Fifth, the great bulk of the telecommunications infrastructure is largely controlled by a relatively few carriers, providers, and manufacturers. For example, in the United States the top 20 local telephone and long distance carriers control more than 97 percent of the total number of U.S. telephone lines. In the manufacturing context, the majority of the domestic and international telecommunications industry's equipment comes from Lucent, Alcatel, Siemens, Nortel Networks, Fujitsu, and a handful of others.

Our Three Dimensional Approach

Remediating the Year 2000 date rollover problem is, first and foremost, the responsibiltiy of the business sector. Each company must set about finding where the problems exist and must take the steps necessary to fix or replace those systems. The Commission, however, as the governmental agency with oversight responsibility for the communications industry, has a vital role to play in helping the industry prepare for the Year 2000.

In order to define and execute that role, the Commission, in early 1998, organized its Task Force for Year 2000 Conversion. The Task Force is comprised of members from all of the Bureaus and Offices in the Commission, and is organized to address issues in each of the communications sectors, i.e., wireline, wireless, satellite, international, cable and broadcast television and radio. The Task Force is chaired by Commissioner Michael Powell, who also serves as the FCC's Defense Commissioner.

The Task Force adopted the following three dimensional approach to the address the Year 2000 problem: (1) outreach and advocacy; (2) monitoring and assessment; and (3) contingency planning and regulation.

Outreach and Advocacy

The strategy of the Commission is never to miss an opportunity to talk about the issue and to deputize as many speakers as possible. Commissioner Powell, his fellow commissioners, and members of the Task Force have appeared at national and global conferences to facilitate the sharing of information and to promote the development of partnerships, both among industry members and between industry and government. Commissioner Powell has published numerous articles in both general and trade publications. The Commission has also sent letters to small rural telephone services as well as to our regulatory counterparts abroad raising the need to take action on this issue.

Forums

A key tool in our outreach program has been holding public and private forums. These forums provide an opportunity to explore the issues, share information and to generally raise the awareness level of industry members as to the problems they may face. The following is a list of forums held to date:

Date	FCC Year 2000 Forums
June 1, 1998	Forum on Public Safety and the Y2K Problem
June 2, 1998	Year 2000 Computer Date Change Issues Affecting the Commercial Wireless Community
June 12, 1998	Year 2000 Computer Date Change Issues Affecting the Private Wireless Community
June 29, 1998	International Bureau's International Telecommunications Forum
June 29, 1998	Wireline Telecommunications Networks and The Year 2000 Problem
July 14, 1998	International Bureau's Satellite Forum
July 16, 1998	Roundtable Discussion on the Cable Industry and the Year 2000 Problem
July 23, 1998	Mass Media Bureau's Forum for Broadcasters
September 25, 1998	International Bureau's Teleconference with HF International Broadcasters
November 10, 1998	Year 2000: Maintaining Customer Premises Equipment and Private Networks
November 16, 1998	Y2K Emergency Response Forum
December 7, 1998	Forum on Antenna Structures and Year 2000 Issues

FCC Year 2000 Website

The FCC Year 2000 Website <www.fcc.gov/year2000/> has become a focal point of FCC Year 2000 communications. See Figures 1 and 2. The Commission has dedicated significant resources into a well-designed website that is easily accessible and user friendly. The website provides information concerning the activities and assessments of each of the Bureaus. It provides links directly to the Year 2000 information of manufacturers, vendors, carriers, and communications companies, and links to associations and other government entities actively engaged in Year 2000 preparation. It also provides model Year 2000 readiness information, information on the Year 2000 Information and Readiness Disclosure Act, copies of speeches, and copies of Commission proceedings that address Year 2000. Finally, many of the Year 2000 Forums and NRIC meetings are broadcast over the Internet with information on how to listen posted at the website and transcripts of the meetings later uploaded to the site. A list of contacts and valuable websites is attached on page 114 and 115.

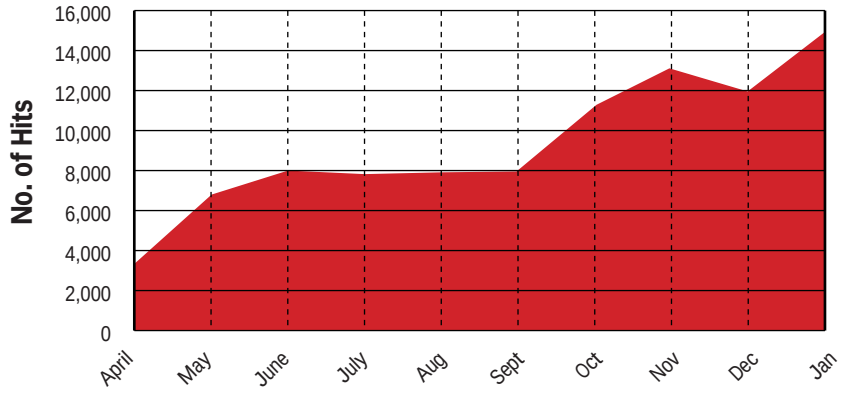


Figure 1. FCC Y2K Web Activity

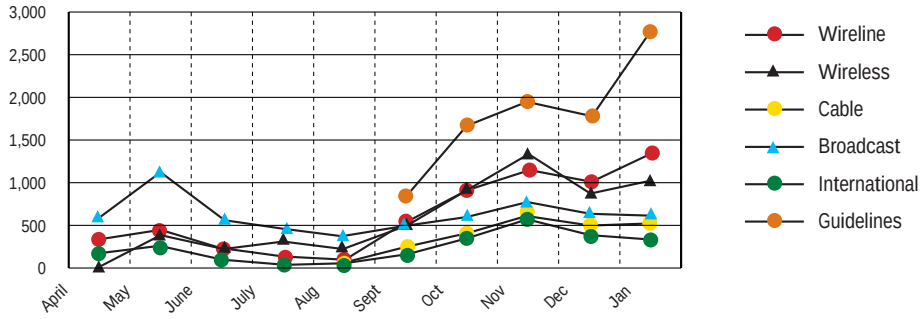


Figure 2. Hits to FCC Y2K Website by Sector

Monitoring and Assessment

The second dimension of our approach is to monitor industry Year 2000-readiness efforts and to assess the implementation of remedial actions and the progress of testing. The Commission has employed a number of methods to gather information including voluntary and mandatory surveys, conducting industry forums, information provided from industry umbrella groups, NRIC data and data from other public sources, including Congressional testimony. Our efforts to assess the communica-

tions industries are designed to answer three questions: First, what are the Y2K problems or issues facing the industry? Second, how pervasive are the problems? And third, where is the industry in addressing the problems? This Report serves as an important part of this assessment strategy.

Contingency Planning and Regulation

The third dimension is contingency planning and regulation. The Commission also is committed to active participation in contingency planning. We are reviewing ways to leverage existing contingency plans, processes and mechanisms to deal with network failure contingencies. In fact, many systems already exist that are designed to facilitate industry-government cooperation in an emergency. In that regard, we are working with the National Communications System (NCS) and the communications industry to facilitate the development and, if necessary, execution of contingency plans in the event that service disruptions occur. The Commission also has taken steps to make sure that all licensees are aware of their regulatory responsibilities and that these responsibilities continue through the millennium rollover. For example, the Wireless Bureau issued a notice reminding tower owners of their tower lighting obligations, an important public safety issue.

Organizational Partners and Assets

President's Council on Year 2000 Conversion

While the Commission takes a lead role in coordinating with the communications industry to promote Year 2000 preparedness, the Commission is only one of many organizations working toward that goal. An important organization in the process is the President's Council on Year 2000 Conversion. The Council, chaired by John Koskinen, was established on February 4, 1998 by Executive Order 13073, and is responsible for coordinating the Federal Government's efforts to address the Year 2000 problem. The Council is made up of representatives from more than 30 major Federal executive and regulatory agencies.

To specifically address this issue, the President's Council established the Telecom Sector Working Group. Commissioner Powell co-chairs the sector group with Commissioner Dennis Fischer of the General Services Administration. The sector group has members from government as well as the industry and is an important vehicle for information sharing between industry and the federal government.

Network Reliability and Interoperability Council

The Network Reliability and Interoperability Council is an important resource not only for the government but also for the industry as a whole. NRIC is a federal advisory committee, formed under The Federal Advisory Committee Act, Pub. Law. 92-463. C. Michael Armstrong, Chairman and CEO of AT&T, chairs NRIC. NRIC was originally convened in 1992 to provide guidance to the Commission on how to promote the reliability of the public switched network. Each NRIC is convened for a period of two years and for a specific purpose. NRIC IV, the current NRIC, is chartered to consider the following: (1) what is the impact of the Y2K problem on the public telecommunications networks, and what are some of the solutions to perceived risks and dangers of that impact (Focus Group I); (2) what is the impact of the Y2K problem on access to telecommunications networks and services from the standpoint of consumer provided equipment (Focus Group II); and (3) what is the current status of network reliability as established by NRIC III (Focus Group III).

NRIC is guided by a Steering Committee that meets monthly to establish agendas, review membership, consider progress, and develop policies for further action. Each of the three Focus Groups is composed of a number of subcommittees addressing the issues involved in the Groups' larger questions. See Figure 3. Focus Groups I and II each include a Subcommittee on Y2K Readiness, a Subcommittee on Y2K Testing, and a Subcommittee on Y2K Contingency Planning. Each of these Subcommittees assesses status and plans and develops recommendations for action to be presented to the full Council for its consideration.

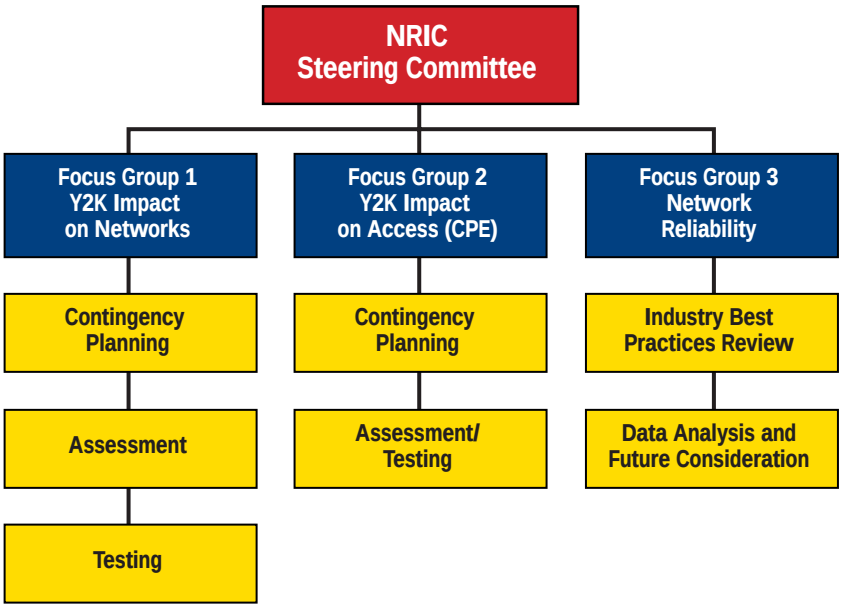


Figure 3. NRIC Organization

National Association of Regulatory Utility Commissioners

State regulatory authorities are also important complementary assets in the FCC's effort to ensure that the integrity and continued operations of the nation's critical communications infrastructure is maintained. State public utility commissions often enjoy an intimate relationship with the small to mid-sized telecommunications carriers in their states by virtue of their rate-making and other statutory authority. As a consequence, the Commission is working with the National Association of Regulatory Utility Commissioners (NARUC) and is specifically working with its Y2K Task Force, chaired by Florida State Commissioner Leon Jacobs, to ensure that telecommunications companies are aware of the seriousness and consequences of the Year 2000 Problem, to provide information and guidance about the problem, to provide remedial actions and solutions, and to assess the extent and pace with which the telecommunications industry is addressing the problem. NARUC can play a particularly valuable role with respect to small and midsize carriers in their states, and with local public safety issues.

National Communications System and Joint Telecommunications Resources Board

The Commission recognizes the importance of its national security and emergency preparedness responsibilities. While only the telephone companies can actually fix problems in the network, it is extremely important that government and industry work together to ensure safety during an emergency and to coordinate the allocation of resources. This includes maintaining emergency communications both among government players and with the industry.

This is done through a number of organizations on the state and federal level. For instance, the FCC Defense Commissioner is a member of the Joint Telecommunications Resources Board. This board has the authority to allocate the nation's communications resources during a national emergency. The Defense Commissioner also represents the Commission at the National Communications System (NCS) where representatives from 23 government departments and agencies can coordinate and resolve Y2K communications problems that might hamper responses to national and local emergencies. The NCS maintains a center that provides for daily communication and interaction between these government entities and the telecommunications industry.

It is in connection with the National Communications System that the Defense Commissioner has close ties with the National Security Telecommunications Advisory Committee. The major industry telecommunications carriers make up this presidential advisory committee. The FCC Defense Commissioner also oversees the Commission's role in the Federal Response Plan which coordinates with the state emergency centers. The Federal Emergency Management Agency administers this plan.

Our Methodology and Information Sources

In order to assess the readiness of the communications industry, the Commission has employed a variety of methods and sources. We have designed an assessment methodology that we believe provides a reasonably reliable picture of where the industry stands. The methodology relies on a variety of sources including direct assessment surveys, forums, one-on-one meetings, information from umbrella groups and other public sources, such as congressional testimony.

The Metric

Most companies addressing the Year 2000 Problem have a devised a process for finding Y2K problems throughout their systems and for methodically remediating or fixing those systems. First, services are broken down by function, then the process of fixing the problem is broken down into specific steps.

Modern communication systems are extremely complex. However, in general, these systems can be broken down into three major subsystems: network elements, support systems, and auxiliary systems. These subsystems are defined as:

Network elements—those systems, components, or software that directly affect communications transmission and/or reception (e.g., computer switches, routers, and amplifiers).

Support systems—operations support and administrative maintenance systems (such as maintenance, billing, parts ordering, etc.).

Auxiliary systems—systems or components such as payroll, human resources, security and alarm control systems, environmental control systems, etc.

Each of these equipment types must undergo a step-by-step process by which Year 2000 problems are identified and fixed. While the process each company uses may differ, we have found that many of the communications companies use a process similar to the one outlined below. Thus, we have adopted the following commonly used process to identify how far along a company has progressed.

Inventory Phase

This step consists of performing a complete survey of computer, electronic, and communications systems, including the largest mainframe computers, communications computers, routers, switches, embedded processors in control systems such as heating, ventilation, and cooling systems, and facsimile machines.

Assessment Phase

This step attempts to determine whether or not the systems or components identified in the inventory phase will be able to process information in a consistent manner before and after the rollover to Year 2000. If the system is not ready, the appropriate remediation is identified along with the priority of the remediation of this piece of equipment. Assessment may be as simple as contacting the system's vendor, or as complex as evaluating custom programs.

Remediation Phase

This step involves repairing, replacing, or retiring the hardware or software in the systems or components identified in the assessment phase as appropriate.

Unit Testing Phase

Once systems or components are remediated, they must be tested to determine whether all Year 2000 problems have been solved. Typically, individual systems or components are evaluated with a varying range of dates. Each system or component should operate properly before and after the introduction of test dates (e.g., December 31, 1999, January 1, 2000, and February 29, 2000).

Integration and System Testing Phase

Finally, systems or components must be tested together in their operating environments.

Rollout Phase

Some large companies operate large networks of subsystems. These companies may first remediate and test a pilot system in isolation or in a lab. Having finalized a remediation, it will then be rolled out to the company's entire system.

Our survey asked each company to respond with the percentage of completion in each of the above categories. We then aggregated the data for each industry for this report.

The survey also asked for data on contingency planning. The process of contingency planning was broken down into the following phases:

Probability of Failure and Risk Assessment Phase

For major subsets of each system, analyze the probability of failure due to Year 2000 date change problems (and for each supplier). For each subset that may fail, what is the risk to business operations of that failure?

Contingency Plan Phase

For those systems with high probability of failure and high risk to business operations, you will need to develop contingency plans.

What Does It Mean to Be Y2K-Ready?

There appears to be a lack of consensus on the question "What does it mean to be Year 2000-ready?" A striking absence of common definitions related to the Year 2000 Problem presently exists. Firms and companies often resort to the ambiguous terms "compliant," "ready," "functional" and "capable." The definitions proffered by governmental and private entities vary greatly as well.

For example, the Federal government defines Year 2000 compliance in section 39.002 of the Federal Acquisition Regulations:

> Year 2000 compliant means, with respect to information technology, that the information technology accurately processes date/time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations, to the extent that other information technology, used in combination with the information technology being acquired, properly exchanges date/time data with it.

48 C.F.R. § 39.002 (1998). A "compliant" product, according to the Hewlett-Packard Company, "accurately processes date data (including, but not limited to: calculating, comparing and sequencing dates), from, into and between the twentieth and twenty-first centuries, the years 1999 and 2000, and leap year calculations, when used in accordance with its product documentation, and provided all other products used in combination with the product properly exchange data with it."

SBC Communications, Inc. prefers "Year 2000 ready" and provides the following definition: "the system or service must successfully pass the inventory, assessment, testing and implementation phases and, to the extent applicable, be able to read, compute, store, process, display and print calendar dates falling after December 31, 1999, without interruption or degradation to service."

We also note that some consortiums such as Bellcore (now Telcordia Technologies, Inc.) and the Institute of Electrical and Electronics Engineers, Inc. have developed formal, detailed standards for Y2K remediation.

Regardless of this definitional debate, however, what is important is that systems and services continue to work through critical date rollovers, regardless of the definition employed.

Our Sources

The Commission has employed a variety of sources to assess the industry. We have sent to communications companies both mandatory and voluntary surveys. The latest survey employs not only the metric discussed above but a short questionnaire meant to supplement the metric and provide other indicia of preparedness, such as whether a company's management is actively involved in the remediation process.

NRIC also has been an invaluable resource for assessment. Preliminary data collected by NRIC was presented to the full committee on January 14, 1999, and is largely contained herein. That material can also be found at the NRIC website <www.nric.org/meetings/>. Because of the nature of the Y2K problem, NRIC IV continues to work under a strict timeline. The next meeting of NRIC is scheduled on April 14, 1999, and will be devoted to recommendations from Focus Groups I and II, based on results of tests to be completed during the first quarter of 1999. A meeting on July 14, 1999 will include Focus Group and NRSC reports. Between July and October 1999, an industry forum is planned to share NRIC IV results. A meet-

ing on October 14, 1999, will hear status reports from the Focus Groups and NRSC, and a final meeting on January 6, 2000, will review the success of NRIC IV and propose future actions for NRIC V.

The public and private forums that we have held, as well as one-on-one discussions, have provided us with information on industry readiness. In addition to permitting us to identify issues, we have also been able to query industry members on the rate of progress, where and when problems may occur and what phases may take longer than others. For example, we understand from the forums that the testing phase can constitute a disproportionate part of the effort to be Y2K-ready.

We have also learned from our partnership with key industry associations and umbrella groups. These groups include, but are not limited to, the National Cable Television Association, the National Association of Broadcasters, the Cellular Telecommunications Industry Association, the Personal Communications Industry Association, the United States Telephone Association, the Satellite Industry Association, the Association of Public-Safety Communications Officials, the American Mobile Telecommunications Association, the National Telephone Cooperative Association, the Organization for the Promotion and Advancement of Small Telecommunications Companies, and Telecommunications Industry Association (a more extensive list of communications associations engaged in Y2K preparations can be found at <www.fcc.gov/year2000/links-assoc.html>). These groups support the Commission's efforts by helping us reach out to their many members and by providing valuable information about the problem.

Our association with the International Telecommunication Union provides valuable information on international preparedness. The ITU is associated with the United Nations, and has formed a Y2K Task Force which the FCC supports. More on the work of the ITU can be found in the International Section (see page 81).

In addition to these sources, we have closely monitored public sources such as Congressional testimony by industry members, public disclosures by companies, and reports from other groups on the industry's status.

Consumer Information

Providing information to consumers on the readiness of critical infrastructures is a critical mission of the Federal Government's Year 2000 efforts. As a recent survey demonstrates, the more that the public knows about Y2K, the less anxious they are and the more they are able to prudently prepare.

To help with this preparation, each of the industry sections included in this Report concludes with a series of recommendations directed at consumers of communications services. It is our hope that these tips will provide guidance on reasonable steps that consumers can take to minimize any potential impact Y2K disruptions might have on their lives. Although we believe that the majority of consumers should not experience Y2K problems, contingency planning is an important part of Y2K readiness.

In addition, World Wide Web links to the Year 2000-readiness information of individual communications companies have been gathered and posted on the Commission's website <www.fcc.gov/year2000/>. Also included are links to the Year 2000 Readiness information of manufacturers and vendors. The Commission's website also links directly to the Year 2000 information of communications associations; while association information may be more general, the associations may have useful advice on how to work with your critical services in order to get the information that you need.

The Commission is also participating in the Federal Trade Commission's Year 2000 consumer hotline (1-888-USA-4-Y2K), providing relevant information in response to consumer inquiries. In addition, the FCC's National Call Center is prepared to respond to Y2K consumer inquiries.

FTC's	**FCC's**
Year 2000 Consumer Hotline	National Call Center
www.consumer.gov/y2k/index.html	www.fcc.gov/cib/ncc/Welcome.html
1-888-USA-4-Y2K	1-888-225-5322
	callctr@nightwind.fcc.gov

For those individuals who operate their own private communications services off the public or commercial networks, the Commission has provided model material on how to conduct a Y2K assessment <www.fcc.gov/year2000/y2kguide.html>. Associated with the guide are links to material on specific points, which provide far greater and more expansive information on a given subject (for example, additional information on testing procedures is linked for those engaged in this important step).

It cannot be stressed enough that it is the owners and holders of private networks and "customer premise equipment" who are responsible for that equipment. While this report presents material on the readiness of public and commercial services, the consumer must take responsibility for the equipment at their end of the public networks. Whether it is data networks, fax machines, or private telephone networks behind Private Branch Exchanges (PBXs), the owners of this equipment must take responsibility for this equipment. We encourage such owners to take advantage of the many resources available to help with Year 2000-readiness.

Wireline Telecommunications

SECTOR REPORTS

WIRELINE TELECOMMUNICATIONS

Summary

- In all likelihood, there will be dialtone when the phone is raised on New Year's day.
- Large carriers covering 92% of the nation's phone lines report that they will be fully tested and compliant by June 1999. Our assessment supports that claim.
- Medium and small carriers that serve many rural and insular areas lag somewhat behind, and generally will not complete their full remediation until the very end of 1999. The tight time schedule is cause for some concern.
- Test results are encouraging, showing that remediation to date has been successful.
- Private users are responsible for equipment used to connect to the network, such as phones, faxes, modems and PBXs. They must take steps to check and fix this equipment.

INTRODUCTION

The wireline telecommunications network is one of the most critical infrastructures that could be affected by the Year 2000 rollover. Individuals and companies worldwide rely heavily upon the wireline telecommunications network to communicate with other parties, transfer data, and to use the Internet.

Based upon available information developed by others, as well as by the Commission, we believe most domestic wireline telephones will work, that is, there should be dialtone when the handset is picked up and that calls should go through much as they do now. To the extent any Year 2000 problems are encountered, we expect them to be limited geographically and caused by carriers or customers that did not take adequate steps to avoid disruptions.

In this section of the report, we:

1) describe the telephone network, its participants, and its vulnerabilities to Y2K;
2) assess the industry's preparedness for the Year 2000 and the status of testing; and
3) discuss contingency planning.

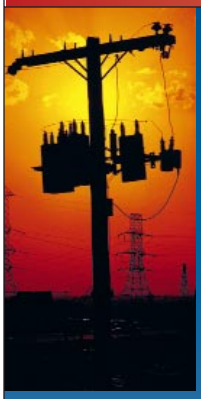
THE NETWORK

A conventional telephone call across the street typically involves only the local telephone carrier and its domestic telecommunications network. A call across the globe often involves a large number of domestic and international telecommunications networks. Thus, in assessing the potential impact of Year 2000 problems on our ability to make telephone calls, important questions involve the network origin and destination of these calls. Obviously, the more networks involved, the greater the chance the call might encounter a Year 2000 problem.

The telecommunications network can be illustrated using the simple schematic found in Figure 1. The left-hand side represents customer equipment and networks while the center and the right side make up the public network.

Network Subsystems

To understand better the vulnerability of our public networks to potential Year 2000 problems, we break down the network into its subsystems. Those subsytems are (1) network elements, (2) support systems, and (3) auxiliary systems. In varying degrees,



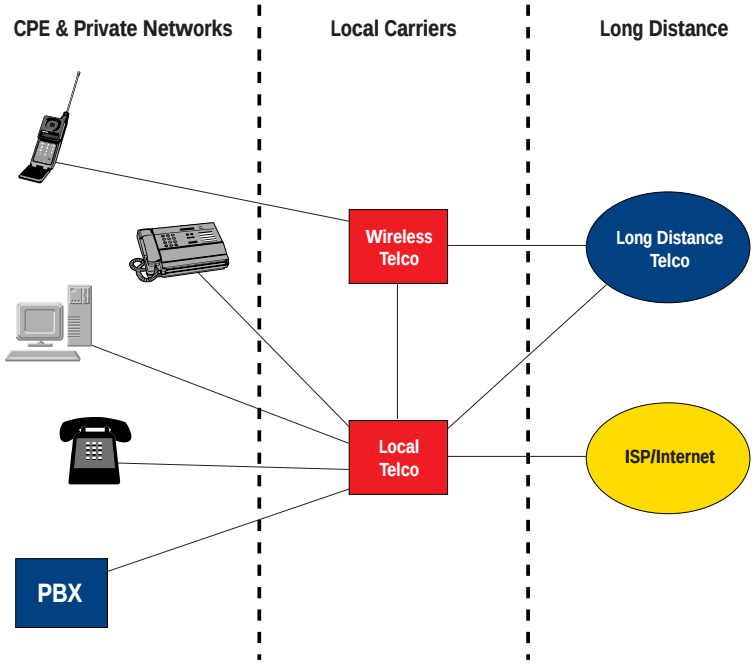


Figure 1. The Network

each of these components must be Y2K compliant to ensure the availability of telephone service in the Year 2000.

Network Elements

Of these three, network elements are the most important. Network elements typically include switching and transmission systems, signaling systems, and network management systems.

Switching and Transport Systems: It may be useful to think of a switch as a waypoint to a destination and transmission equipment as the physical path to that destination. Only a single switch may be involved in completing a call across the street where many switches may be involved in long distance calls. If a Year 2000 problem disables a switch or some of the transmission equipment in a public network, traffic destined for that switch or traffic being handled by that equipment would either be re-routed to the destination by the signaling system or by the network management systems described below. Only if both of these systems fail would the call be blocked with a busy signal or pre-recorded message.

Signaling Systems: The completion of a conventional telephone call depends on the successful transmission of both the signaling portion and the subsequent voice portion of a call. The signaling portion provides call setup, maintenance, and termination. The signaling portion of a conventional call may either travel ahead of and along the same physical path as the voice portion or the signaling portion may be carried by an entirely separate network to conserve space on the voice network. Because of their heavy dependence on computer technology, the components of the signaling network are each vulnerable to potential Year 2000 problems and must be checked for these problems, just like the components of the transport network. Should Year 2000 problems be encountered in certain segments of the public telecommunications network, the nationwide signaling network will be important in

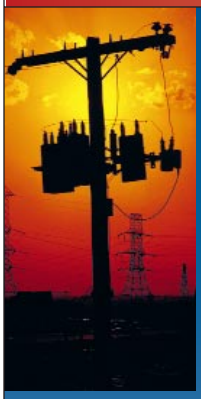
avoiding or reducing those problems. Absent other arrangements, these timing mechanisms prevent the accumulation (or "queuing") of calls waiting to be processed by the network. If this happens, the caller will get a busy signal. However, this can also happen when traffic is heavy, as we anticipate will be the case on New Year's Eve, 1999 or New Year's Day 2000. As a result, if a caller gets a busy signal, that caller should not automatically assume that a Year 2000 disruption has occurred.

Network Management Systems: A third group of network elements in telephone systems is the network management systems. Among other functions, these management systems monitor the traffic coming into, departing from, and moving within the network. Based on the traffic and other network constraints (e.g., blockages), these systems can re-route traffic within the network as appropriate. Such re-routing may be done manually by a network manager, automatically by the management system itself, or in both ways. Management systems become particularly important when switches, transmission equipment, signaling systems, or other network elements fail or become overloaded or when outside forces such as bad weather or line cuts constrain network performance. Accordingly, these management systems, like signaling systems, will be important to the avoidance or reduction of any Year 2000 problems that occur in the public network. Network management systems themselves may have Year 2000 problems associated with them. Thus, carriers must include such systems in their Year 2000 remediation processes and contingency planning. Because of their importance to the network, certain failures of these systems, regardless of the source, could disrupt communications on the public network.

Support and Auxiliary Systems

While not directly involved in the transmission, switching, or management functions of the public network, support and auxiliary systems play important roles in the continued functioning of telecommunications networks. These systems handle the key operations, administration, and maintenance functions of networks. In testimony before the Senate Special Committee on the Year 2000 Technology Problem, Dr. Judith List, Vice President, Integrated Technology Solutions at Bellcore (now known as Telcordia Technologies, Inc.), observed that there is little date-sensitive information in the fundamental call processing or data routing capabilities of the networks but that such information is found in support and auxiliary functions. The Committee's subsequent report on the impact of the Year 2000 problem noted that the disruption of these functions initially could cause some confusion for consumers with inaccurate bills and delays in service requests. The Committee also expressed concern that a buildup of such errors could eventually begin to degrade service.

Support systems control billing, the provision of service, maintenance, and limited network surveillance. Many date-sensitive operations are incorporated into support systems. Year 2000 problems in these systems could affect customer billing, the timely implementation of new services, or cause the cancellation of existing services. Similarly, a Year 2000 failure could delay critical maintenance until the failure is noted and corrected or until the service ceases. In this situation the Year 2000 problem might not become apparent until well after the Year 2000 rollover. Most carriers currently maintain back-up arrangements for their most critical support systems. For example, carriers usually have a battery and/or generator to maintain service in the event of power failures. For this reason, short-term problems with support systems are not expected to impact the handling of calls and other traffic by the public network. Auxiliary systems include payroll, human resources, management systems, security and alarm control, and environmental control systems. Because these systems are often highly automated, they may include date/time functions vulnerable to Year



2000 problems. Any Year 2000 or other failures in these systems, however, are not likely to interfere immediately with the supported telecommunications systems because of the indirect nature of that support. Adverse impacts, if any, are more likely to occur over a much longer period. Depending on the particular system involved, there might be no network impact if the problem is detected and addressed or only a delayed impact when the proper availability or functioning of that element becomes critical to network operation. There may be exceptions, however. For example, the failure of security systems or climate control in some cases might disrupt service immediately or more quickly than would otherwise be the case.

Customer Premises Equipment and Private Networks

Summary

- Customer premises equipment may be affected and is the responsibility of users.
- Owners of smaller private networks as well as residential and small business customers should inventory equipment and check with manufacturers to determine its Year 2000 readiness.
- Large private telephone networks are subject to Year 2000 problems similar to public networks.
- Carriers, manufacturers, and others maintain Internet websites with Year 2000 information on various types of customer premises equipment.

As important to customers as the network itself are the devices customers use to connect to it. Simple customer equipment, like a telephone handset, is unlikely to be adversely affected by Year 2000 problems. While handsets may include computer chips that facilitate such functions as automatic dialing, those chips are unlikely to have date/time functions that would be vulnerable to Year 2000 problems. Fax machines and devices that print out or keep track of the date may list the wrong date but should otherwise function. Larger, more complex equipment standing alone or configured into private systems may be vulnerable to Year 2000 problems to the extent that date/time functions are present in such equipment and integral to its operations. For example, financial transactions often require date/time stamps to document when transmissions are made.

Both large and small businesses must take a proactive approach to the remediation of potential Year 2000 problems. Because the telephone company's responsibilities generally end where private equipment connects to it, customers bear responsibility for the continued operation of their own equipment. Customers must check their own equipment and networks carefully and call their vendors or equipment providers to determine what steps they must take to ensure that their equipment will function in the Year 2000. The owners of private equipment should also make contingency plans for conducting their telecommunications business, should their equipment fail to operate.

Although our primary focus is on commercially operated private networks, we note that federal, state, and local government entities operate extensive private networks of their own. Like their counterparts in the private sector, these public sector networks may also be vulnerable to potential Year 2000 problems. The federal government operates both local and long distance networks, many of which are located on military installations. The federal government's long distance networks include the Federal Telecommunications System (FTS-2000), managed by the General Services Administration, the Defense Information System Network (DISN), and the Diplomatic Telecommunications Service (DTS). Several state governments

operate their own telecommunications systems to facilitate communications among state and local agencies.

While the Commission no longer exercises jurisdiction over customer equipment, it remains interested in that equipment because of its importance to the public network. In November 1998, the Commission sponsored a public forum entitled, "Year 2000: Maintaining Customer Premises Equipment and Private Networks." At that forum, Commissioner Michael Powell noted the growing public interest in potential Year 2000 problems with conventional computer systems but cautioned the public not to overlook potential Year 2000 problems within their own private networks. Due to the size and complexity of larger private networks, owners of those networks face somewhat different Year 2000 challenges than owners of smaller private networks. For this reason, we discuss them separately.

Small Private Networks

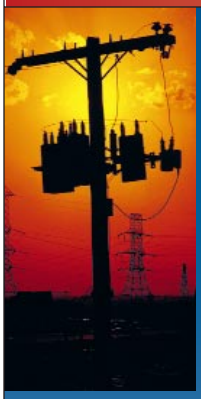
The Commission encourages owners of smaller private networks to review the six-phase analytical process (inventory, assessment, remediation, unit testing, integration and system testing, and rollout) outlined in the beginning of this report (and available on our web page) and adapt that process to their needs. Residential and small business customers should inventory all of their telecommunications equipment, review manufacturers' websites for information on the Year 2000 status of their equipment, and contact the manufacturers to follow-up on any questions not answered by the website. However, this process is not always an easy one. At the November 1998 forum, one participant noted that it is sometimes difficult for businesses to locate manufacturers for all of their telecommunications systems, particularly when essential components were installed many years ago or customized to the businesses' needs over time. Another problem is that the manufacturers of some key components may no longer be in business or may not maintain websites with detailed Year 2000 information on their products.

Where manufacturers of such key components are no longer in business, owners of such equipment are urged to determine what, if any, Year 2000 testing has been performed on that equipment by the distributor of that equipment, by the local telephone company, or by other organizations. For example, the General Services Administration maintains a website with extensive information on the Year 2000 status of various telecommunications equipment used by the Federal Government. The GSA website can be found at <y2k.fts.gsa.gov>.

The Senate Special Committee on the Year 2000 Technology Problem notes in its recent Year 2000 report that competition for resources in January 2000 may make it difficult for medium/small-sized businesses to secure help in resolving Year 2000 problems. Accordingly, the Committee cautioned such businesses and other organizations to make these communication systems a priority now.

Large Private Networks

Customers with large private networks have a much more complex task in addressing potential Year 2000 problems with their networks than those with small networks. Much like the local and long distance networks in the public telecommunications network, large private networks have a number of important and interrelated groups of network elements. Large private networks typically have one or more switches. One type of switch in a large private network is the private branch exchange or "PBX." A PBX may be used to route calls arriving at and departing from a business establishment. A Year 2000 problem within a PBX could interfere with traffic between the public network and the private network. For example, if the PBX serving the



headquarters building of a large corporation was not made Year 2000-ready, headquarters employees might lose their dial tone or outgoing calls. These calls might be blocked with a busy signal or pre-recorded message. Like their public counterparts, private networks often include network management systems that may be vulnerable to Year 2000 problems. If they have not already done so, operators of private networks are urged to check with the company that built or maintains the network for information on potential Year 2000 problems.

Interface Between Public and Private Networks

One potential issue that has concerned many telephone companies and owners of private networks is whether Year 2000 problems in the public network could have an impact on private networks and vice-versa. NRIC examined this question and explains in its Report that Year 2000 problems with one network are not likely to migrate to connected systems. One possible exception, however, was noted at the Commission's November 1998 forum on customer equipment. At that time, one participant noted that a public network could "infect" a private network if the private network relied on management functions provided by a public network whose management functions were impaired by Year 2000 problems.

THE PARTICIPANTS

Local Telephone Carriers

The seven largest local telephone carriers in the United States are, in alphabetical order: (1) Ameritech, (2) Bell Atlantic, (3) Bell South, (4) GTE, (5) SBC Communications, (6) Sprint, and (7) US WEST. These carriers are responsible for approximately 98 percent of access lines reported to the Commission and approximately 92 percent of all access lines. Carriers with revenues that exceeded $109 million in 1996 were required to file reports with the Commission that contained data on such as access lines.

All other local telephone carriers fall into the category of medium/small carriers. We have included these carriers in one category for the purpose of our Year 2000 analysis because although numerous (there are 1,200-1,300 small- and medium-size local exchange carriers in the United States), they are responsible for only approximately 8 percent of the access lines in the United States. We discuss the results of our Year 2000 analysis of all local exchange carriers in the next Section of this report.

Long Distance Carriers

The three largest long distance carriers in the United States are, in alphabetical order: (1) AT&T, (2) MCI/WorldCom, and (3) Sprint. These carriers earn approximately 82 percent of all long distance revenues in this country. These carriers are independent and may be affiliated with any or all of the local carriers. In addition, there are a large number of medium/small long distance carriers. Although a few of the latter are facilities-based (i.e., they own the switching and cables necessary to provide long distance service), most such companies are resellers of the major carriers' long distance services. Accordingly, the impact of the three major carriers's remediation efforts is in effect higher than that indicated by their revenue share. Medium/small local carriers included in the Commission's survey that were also long distance resellers were also asked to report on their long distance remediation efforts.

ASSESSMENT

Assessment of Local Telephone Carriers

Summary

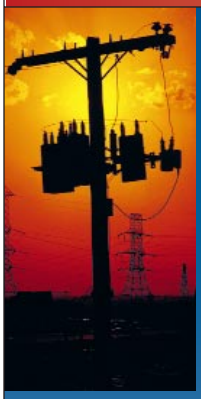
- The Commission's assessment of the remediation activities of local telephone companies is based on numerous sources.
- The large local carriers are likely to be compliant by mid-year.
- Large carriers have devoted considerable resources to remediation and have shared information on best practices.
- Medium/small local carriers lag significantly behind the large local carriers in their remediation activities.

Methodology

Our primary sources for information on local carrier readiness for Year 2000 are surveys conducted by NRIC and the Commission. We also rely on information provided by the Rural Utility Service (RUS) of the United States Department of Agriculture and the National Telephone Cooperative Association. The surveys conducted by all these groups were supplemented by information obtained during industry meetings and at many forums sponsored by the Commission.

NRIC conducted a survey of 29 wireline local telephone companies. The survey subjects included the seven largest local carriers (i.e., the Bell Operating Companies, GTE, and Sprint) and 22 medium/small-sized local carriers. The latter group included a representative sample of such carriers available to NRIC. The 29 survey subjects collectively represent approximately 93-94 percent of the switched access lines in the country. This survey asked the subjects to report on four major activities associated with Year 2000 preparation. The activities are: a) awareness, defined as inventorying and assessing system components; b) renovation, defined as making necessary upgrades; c) validation, defined as unit and interoperability testing; and d) implementation, defined as installation and rollout of the compliant system elements. NRIC requested the subjects to respond to identical surveys for two time periods (September 1998 and December 1998) in order to assess not only the status of preparedness, but also to evaluate how quickly these carriers were remediating their systems.

To supplement the work of NRIC with respect to small carriers, the Commission conducted its own survey of 1,200 medium/small local carriers and long distance resellers that account for the remaining access lines in this country. Although these carriers were directed to report on their Year 2000 efforts for their local operations, we also asked for information regarding other types of telecommunications services they may provide, such as long distance or wireless services. Of the 1,200 companies surveyed, 654, or 55 percent, responded by the response deadline. Of the timely respondents, 589 are medium/small local carriers, and 65 are small long distance resellers. The survey respondents were asked to provide information on a number of issues. These included: 1) what resources they were using to address Year 2000 issues; 2) their interaction with vendors and other carriers; 3) the standard they have adopted, if any, for Year 2000 compliance; and 4) whether they have a formal remediation process. The survey questionnaire is attached to this report. In addition, respondents were asked to fill in matrices showing the progress of their remediation and contingency planning.



Wireline Telecommunications

RUS conducted a voluntary survey of its electric and telecommunications company borrowers. RUS received responses to all of its survey questions from only 100 of the 457 telecommunications companies queried. Other respondents answered only a portion of the questions posed in the survey. Although incomplete, the RUS survey results are supportive of the other surveys conducted on wireline carrier Year 2000 preparedness.

Assessment Results for Local Telephone Carriers

The largest local carriers are well on their way to being Year 2000 compliant. NRIC projects that each of these carriers will be 100 percent compliant, including having their contingency planning in place, by the second quarter of 1999. The medium/small local carriers are generally not as far along on the timeline for compliance, but those responding to the surveys do plan to be fully Year 2000 compliant by the fourth quarter, 1999.

Large Local Carriers

The NRIC study is our primary source of information for the analysis of the readiness of the seven largest local carriers. Since these carriers control 92 percent of the access lines in the country, the extent of these carriers' Year 2000 readiness is of paramount importance. Fortunately, the news is good with regard to the preparedness of these carriers.

The NRIC data indicate that, as of September 1998, 71 percent of the largest local carriers' systems had been renovated (remediated) for Year 2000 problems. This includes all aspects of their systems, including auxiliary systems, relating to non-communications elements of their physical plants. As shown in Figure 2, by December 1998, the progress of these carriers' renovation effort had increased to 86 percent. Similar progress was made in all other aspects of achieving compliance.

The data suggest that the large local carriers are moving rapidly towards deploying Year 2000 upgrades. NRIC projects that the largest carriers will have completed all remediation activities by June 1999. Based on the progress being made, as well as the projected June completion date, the vast majority of access lines in the United States will be remediated and therefore will have a high probability of working on January 1, 2000. The progress of the large carriers can also be seen in Figure 3 that shows the progress that they are making on key system components.

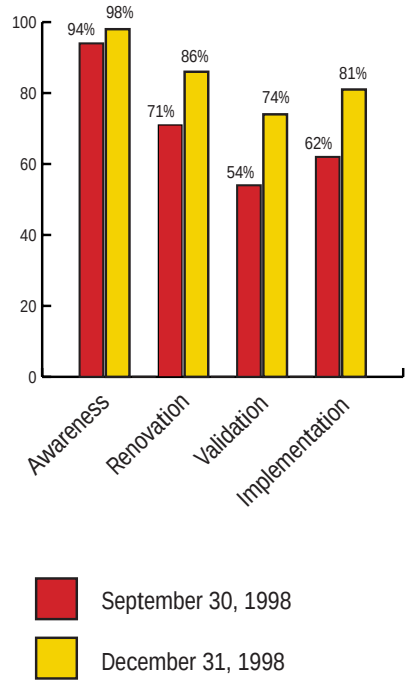


Figure 2. Y2K Lifecycle Compliance Status Rate of Change; Large Local Telephone Carriers; September–December 1998

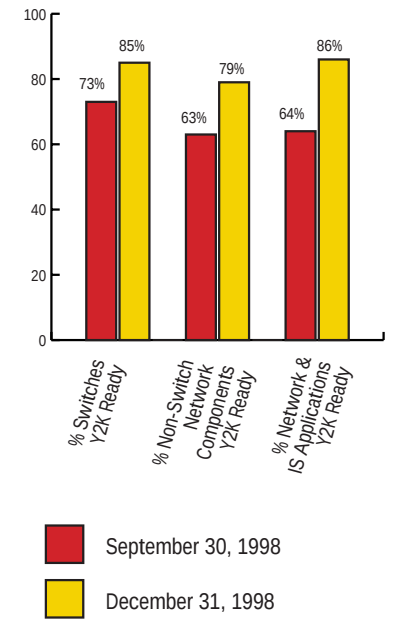


Figure 3. Large Local Telephone Carrier Compliance Status; Rate of Change; September–December 1998

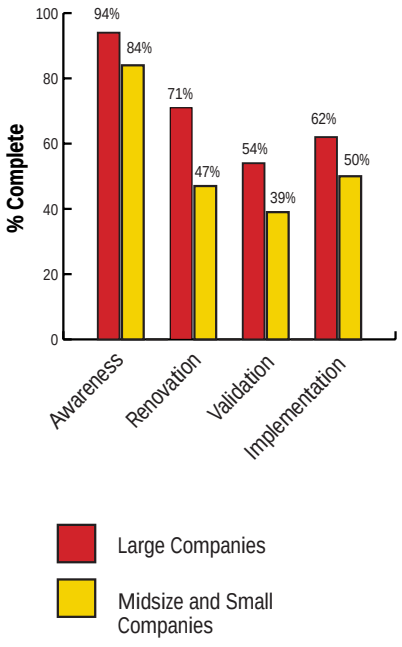


Figure 4. Y2K Lifecycle Compliance Status; Large - and Medium-Size Local Telephone Carriers; September 30, 1998

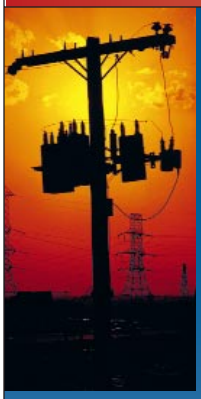
Medium/Small Local Carriers

Although they control only approximately 8 percent of the access lines in this country, the medium/small local carriers provide telephone services to many households and businesses, some of which serve rural and remote areas. For these customers, the telephone is of life-or-death importance, even more so since Year 2000 falls in the winter season for much of the country, when adverse weather conditions may create or compound emergencies. Other medium/small carriers serve urban areas where they are used to conduct business, permit residents to remain in contact, and ensure the availability of government and emergency services.

NRIC Study — Data for the 22 medium/small local carriers surveyed by NRIC indicate that, as of September 30, 1998, these carriers lagged behind the large carriers in Year 2000 preparedness.

As can be seen in Figure 4, NRIC estimates that the medium/small carriers are approximately 24 percent behind the major local carriers in implementing remediation of equipment. Looking at the major system components, the NRIC data again show that the medium/small carriers lag behind the large carriers except in non-switched network components, where they have a slight edge. See Figure 5.

Commission Survey — In order to supplement the NRIC survey with respect to small carriers, the Commission requested medium/small carriers to indicate the status of their remediation activities as of the end of December 1998 and to project when they planned on completing them. Figures 6-11 show the progress for the roughly 50 percent of carriers that indicated that they had formal remediation plans. Each chart represents one phase of the remediation life cycle and breaks down equipment and software into network elements, support systems, and auxiliary systems.



Wireline Telecommunications

The Commision data presented in the charts support NRIC's conclusion that medium/small local carriers lag behind the large carriers in remediation planning. In fact, the Commission's survey results suggest that the lag may be greater than what is shown by NRIC's data. A direct comparison for each step of the remediation cycle between the medium/small local carriers surveyed by NRIC and the medium/small carriers surveyed by the Commission is somewhat complicated by the more detailed steps used in the Commission survey. As noted, NRIC used a four-step remediation analysis instead of the six-step analysis used by the Commission. In spite of this difference, we believe that an overall comparison can be made between the level of remediation achieved by the medium/small carriers surveyed by NRIC and the level of remediation achieved by medium/small carriers surveyed by the Commission. As shown in Figure 5, NRIC reports that by the end of 1998, the medium/small local carriers remediated 62 percent of their switches, 65 percent of their non-switch components, and 60 percent of their network information systems applications. The Commission data indicates that by the end of 1998, medium/small carriers responding to its survey indicate that they had remediated only 19 percent of their switch elements, 14 percent of their support systems, and 20 percent of their auxiliary systems. We believe that this difference is directly attributable to the size of carriers surveyed. NRIC's sample of medium/small carriers was limited to 22 carriers and may have included a greater proportion of larger carriers than the Commission's survey. The Commission's survey was heavily weighted toward small, non-reporting local carriers that serve rural America.

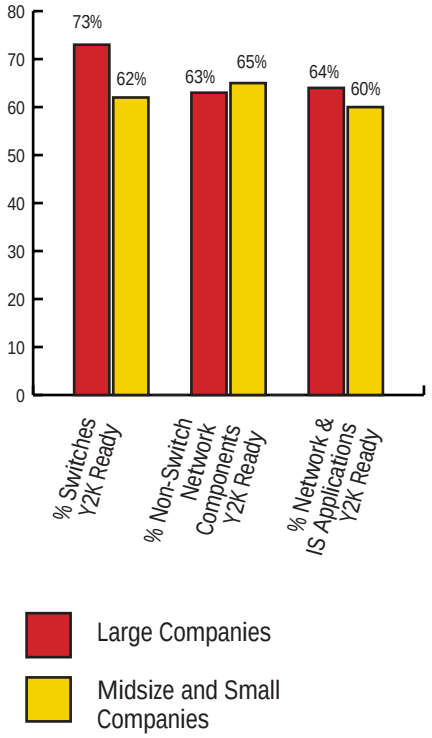


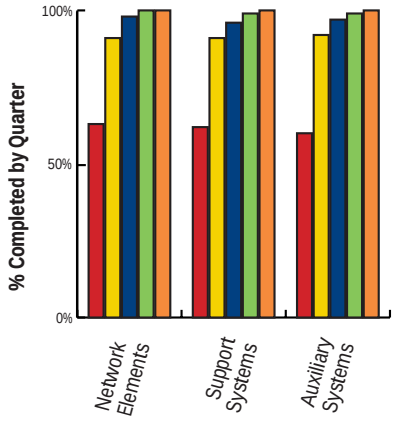
Figure 5. Y2K U.S. Public Switched Telephone Network Compliance Status; Large- and Medium-Size Local Telephone Carriers

The figures also show that many carriers surveyed by the Commission that have formal remediation plans appear to have delayed some important activities until 1999. We believe that this may leave insufficient time for remediation, testing, and where appropriate, rollout, should unforeseen events occur.

These results indicate that small carriers may need additional support in remediating their systems. We plan to work with NRIC and NARUC to determine any problems these companies may be encountering in getting ready for Y2K. We will also continue our outreach to these groups.

Medium/Small Carriers Without Formal Remediation Plans

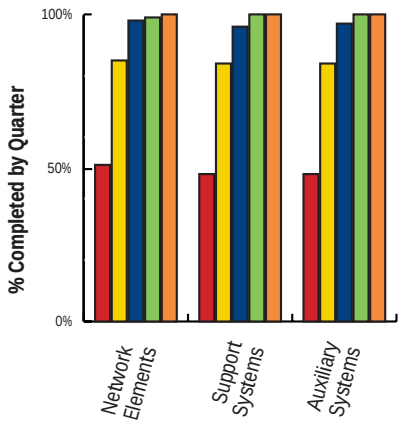
The data collected in the Commission survey indicates that nearly half (46 percent, or 300 of 654) of medium/small carriers surveyed reported not having formal processes for managing Year 2000. This finding is of signigicant concern to us because without plans these carriers may not be taking the necessary steps to become Year 2000-ready.



	Network Elements	Support Systems	Auxiliary Systems
Completed*	63%	62%	60%
1st Qtr 99	91%	91%	92%
2nd Qtr 99	98%	96%	97%
3rd Qtr 99	100%	99%	99%
4th Qtr 99	100%	100%	100%

*prior to 1/1/99

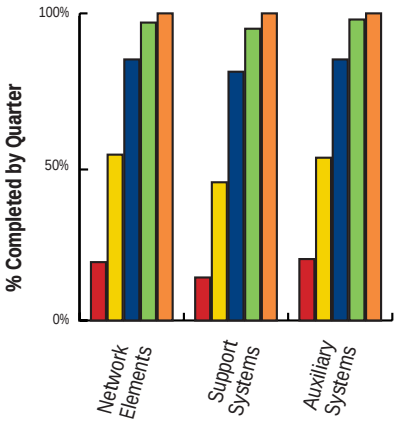
Figure 6. Inventory — Medium/Small Telephone Cos. Percent Complete



	Network Elements	Support Systems	Auxiliary Systems
Completed*	51%	48%	48%
1st Qtr 99	85%	84%	84%
2nd Qtr 99	98%	96%	97%
3rd Qtr 99	99%	100%	100%
4th Qtr 99	100%	100%	100%

*prior to 1/1/99

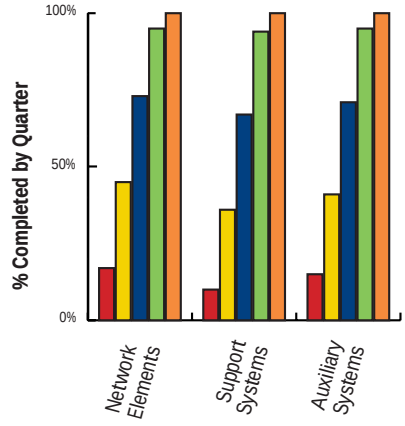
Figure 7. Assessment — Medium/Small Telephone Cos. Percent Complete



	Network Elements	Support Systems	Auxiliary Systems
Completed*	19%	14%	20%
1st Qtr 99	54%	45%	53%
2nd Qtr 99	85%	81%	85%
3rd Qtr 99	97%	95%	98%
4th Qtr 99	100%	100%	100%

*prior to 1/1/99

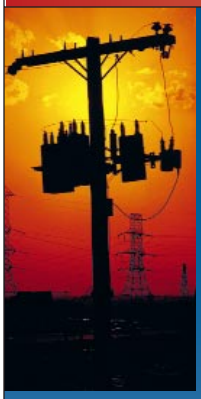
Figure 8. Remediation — Medium/Small Telephone Cos. Percent Complete



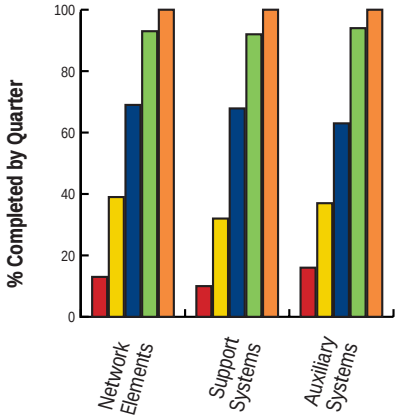
	Network Elements	Support Systems	Auxiliary Systems
Completed*	17%	10%	15%
1st Qtr 99	45%	36%	41%
2nd Qtr 99	73%	67%	71%
3rd Qtr 99	95%	94%	95%
4th Qtr 99	100%	100%	100%

*prior to 1/1/99

Figure 9. Unit Testing — Medium/Small Telephone Cos. Percent Complete



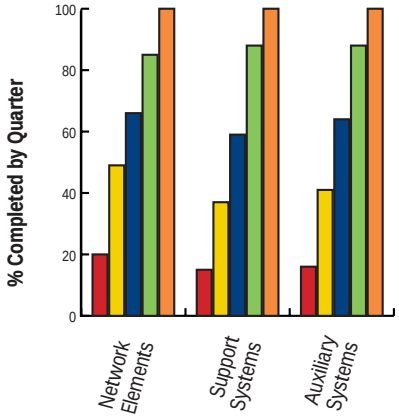
Wireline Telecommunications



	Network Elements	Support Systems	Auxiliary Systems
Completed*	13%	10%	16%
1st Qtr 99	39%	32%	37%
2nd Qtr 99	69%	69%	63%
3rd Qtr 99	93%	92%	94%
4th Qtr 99	100%	100%	100%

*prior to 1/1/99

Figure 10. Integrated Testing — Medium/Small Telephone Cos. Percent Complete



	Network Elements	Support Systems	Auxiliary Systems
Completed*	20%	15%	16%
1st Qtr 99	49%	37%	41%
2nd Qtr 99	66%	59%	64%
3rd Qtr 99	85%	88%	88%
4th Qtr 99	100%	100%	100%

*prior to 1/1/99

Figure 11. Rollout — Medium/Small Telephone Cos. Percent Complete

Because of the complex issues and many decisions that carriers need to make to become Year 2000 ready, formal plans for remediation and contingencies are vital. A concrete planning process helps carriers identify what actions they must take and how quickly they must take them to complete all required remediation and contingency activities. The availability of documented plans also allows Federal and State regulators to measure the progress individual carriers are making to become Year 2000 compliant. With this information, governments are better positioned to support the activities of the carriers and to protect the interests of subscribers.

To better evaluate whether medium/small carriers without formal plans are taking the steps needed to address Year 2000 issues, we examined responses by all carriers to the Commission's survey questions that focused on their knowledge of Year 2000 problems and their activism in resolving them. We then compared responses for carriers that indicated that they had formal processes for remediation and contingency planning to those who did not have concrete plans. We found that carriers without formal planning processes appear to be less informed about Year 2000 issues and less proactive than carriers with plans. Based on this observation, we conclude that carriers that have not planned their remediation activities may have a greater probability of having service disruptions following the Year 2000 rollover than carriers that have such plans as we would suspect. However, we note that nearly all carriers, irrespective of whether or not they reported plans, indicated that their relationship with vendors and customers was "very satisfactory" or "moderately satisfactory." We find this outcome encouraging because vendors are a primary source of information and guidance on remediation. For a complete analysis of the responses to these questions, please refer to page 113.

Conclusions and Remaining Concerns

The preliminary results of the Commission's December 1998 survey and those reported by NRIC for September and December 1998 suggest differences between the progress made by large carriers, on one hand, and that being made by medium/small carriers, on the other. In addition, it appears that the difference in the progress they are making to correct potential Year 2000 problems is reflected in the level of planning that each group appears to have taken for Year 2000 remediation. Specifically, the larger carriers have devoted more resources to planning and management, and have taken a more comprehensive approach to identifying all possible elements that could adversely be affected both on a system-wide and on a national scale. The large carriers have demonstrated a high-level of cooperation among themselves and with their vendors in sharing industry "best practices," which has allowed them to move forward more quickly in addressing Year 2000 problems. The medium/small carriers are lagging behind, with only approximately half of them reporting having formal processes. Those reporting no formal planning process appear to be the furthest behind. Finally, the Commission's finding that medium/small carriers had remediated only 19 percent of their switch elements, 14 percent of their support systems, and 20 percent of their auxiliary systems by the end of 1998 is somewhat below the progress reported in the RUS survey. Nonetheless, both the Commission survey and the RUS survey confirm that medium/small telephone carriers lag significantly behind the largest U.S. carriers in preparing for the Year 2000.

Long Distance Carriers

Summary

- As of December 1998, long distance carriers remediated 74-84 percent of their system components, and plan to complete all remediation by June 1999.
- Long distance service may be disrupted if the local carrier connecting a subscriber to the long distance carrier suffers a service disruption.
- Competition for long distance services and the ability to "dial around" by dialing a 10-xxxxx code will protect subscribers if their long distance carrier fails to provide service.

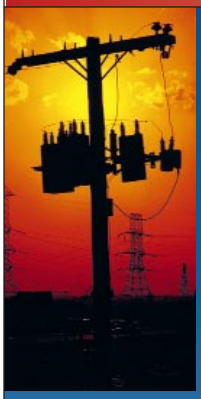
Methodology

In assessing the progress of the long distance industry in addressing Year 2000 problems, we focus on the status of the three largest carriers. We believe that the progress of the three largest long distance carriers for Year 2000 preparation is representative of the entire industry. Consequently, we believe that most, if not all, long distance service will be operational on January 1, 2000 — provided that there is no service disruption at the local level. As we noted earlier, local carriers connect their subscribers to long distance networks and therefore represent a vital link in the provision of long distance service.

If a local carrier suffers a Year 2000 disruption, both one's local and long distance services will be likely to be impaired, even if the long distance network is fully operational. Therefore, a subscriber's ability to make long distance calls will depend on the progress his or her local carrier has made in remediating its system.

NRIC Survey

NRIC's survey asked each of the three major carriers about the readiness of their major components such as switches, non-switch network components, and network information system components. Figure 12 shows the carriers' responses. Note that these carriers are progressing rapidly in remediating their networks. As with the



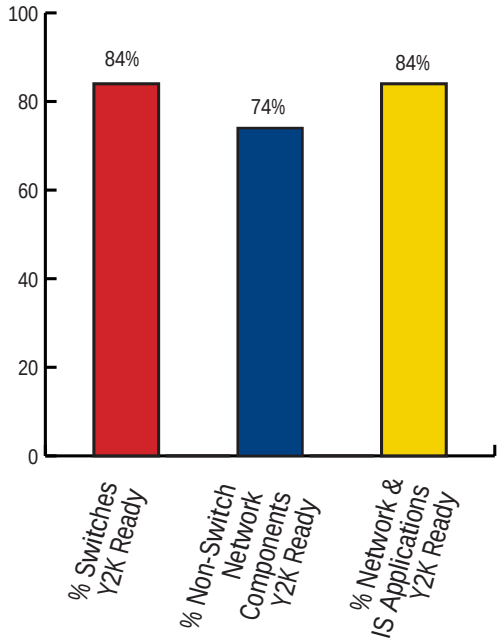


Figure 12. Public Switched Telephone Network Y2K Readiness; Major Long Distance Carriers

largest local carriers, the largest long distance carriers plan to complete their remediation activities by June 1999.

Subscribers that use long distance companies, other than the three surveyed by NRIC, need not be overly concerned about losing long distance service after January 1, 2000. The long distance industry is highly competitive and all long distance carriers, both facilities-based and resellers, are concerned about losing customers due to service disruptions. Therefore, we are confident that each company will make the necessary changes to their system to prevent service loss. Nonetheless, should a long distance carrier's system fail, it is relatively easy for its subscribers to select immediately an alternative long distance carrier. Most subscribers have the capability of "dialing around" their prescribed long distance company by using an alternative carrier's identification code prior to dialing the called party's phone number. Each carrier has a seven-digit "dial around" code (i.e., 10-xxxxx) and will provide that code to the public upon request.

Testing of Equipment

Summary

- Testing for potential Year 2000 problems is divided into five layers: vendor testing, company testing, intra-network testing, inter-network testing, and international testing.
- Reported test results are encouraging.

Paralleling the remediation efforts of the telecommunications industry is an industry supported, comprehensive and redundant testing program designed to ensure that all Year 2000 fixes will be robust under all circumstances. Testing of the

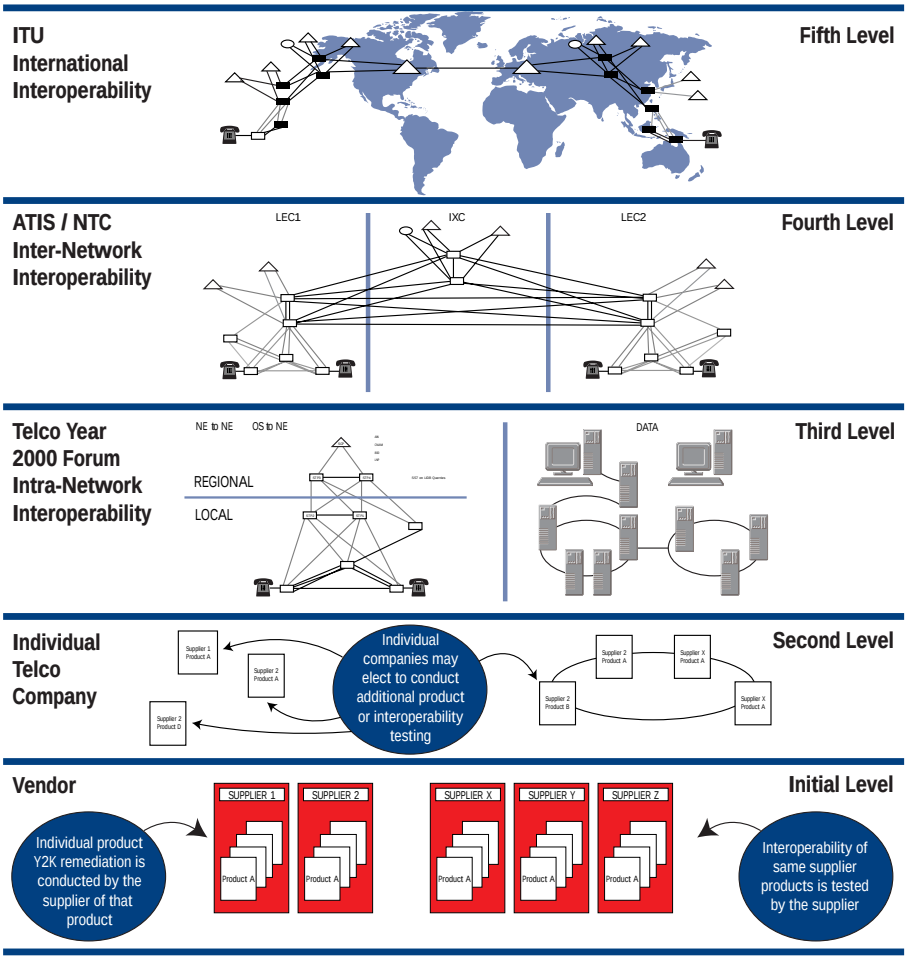


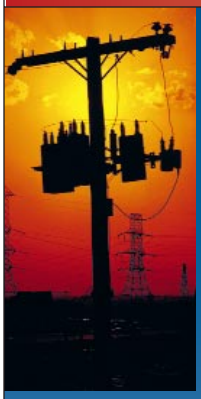
Figure 13. Testing has progressed to the Fifth Level.

same software is being conducted at five levels or layers, each layer being more complex than the prior layer. See Figure 13.

The first layer is at the vendor level. Once a vendor has developed a software fix, it tests that fix at its facilities. Vendor testing is particularly important for small carriers who rely upon vendors to do their unit testing. The second layer is telephone company testing. This level of testing is primarily carried out by the larger companies, which either have their own testing facilities or access to other testing facilities. The next three layers involve more complex network testing.

The third layer of testing is intra-network testing, which tests remediation within a network. The Telco Year 2000 Forum has undertaken this activity. The Telco Forum is an industry group comprised of seven of the largest local carriers: Ameritech, Bell Atlantic, Bell South, Cincinnati Bell, GTE, Southern New England Telephone (purchased in 1998 and now an SBC company), SBC, and US WEST. It is a voluntary, self-funded group that was organized in late 1996 to share information among telephone companies in preparation for the Year 2000.

The Telco Forum spent six months testing system interoperability of equipment and software to identify and minimize potential Year 2000 complications. The testing evolved equipment and software common to the Telco Forum member companies and took place in 20 laboratory environments to simulate network activity and how



it might be affected by the Year 2000. Together, the companies tested the way the equipment would interact in various configurations, and how it might be affected by the Year 2000. Only six anomalies related to Year 2000 were detected in 1,914 test-cases; the six were resolved, retested, and subsequently passed. The Telco Forum test results further support our belief that the public telecommunications network will be functional on January 1, 2000 and that call voice and data call processing will continue without significant disruptions during the Year 2000 transition. Companies or interested parties wishing more detailed information of the Telco Forum testing activities should contact the Forum directly via its website at <www.telcoyear2000.org>.

The next layer of testing is interoperability testing. This regimen of testing is designed to determine the reliability of the interconnected telephone network. This testing is being conducted by an industry working group under the auspices of the Alliance for Telecommunications Industry Solutions (ATIS). The group, known as the Network Testing Committee (NTC), is focusing on call processing, mass calling events and congestion, cross-network services, call completion (credit card/calling card validation, toll free service), rollover to Year 2000 in a local number portability environment, impact of time zones, Government Emergency Telecommunications Service and wireless-to-wireline call completion network impacts. Preliminary review of the data from the testing has been encouraging.

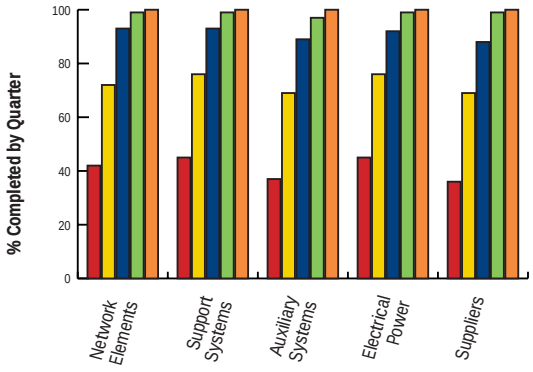
Service providers participating in NTC Year 2000 testing include AT&T and Sprint (as long distance carriers), and Ameritech, GTE, and US WEST (as local carriers). Suppliers including Bellcore (now Telcordia Technologies, Inc.), Lucent, Nortel Networks, and Siemens supported the testing effort by providing equipment and resources. Equipment supplied by these companies for testing represents equipment currently in use in the nation's telecommunications network that services over 90 percent of the users. The Cellular Telecommunications Industry Association and several of its suppliers (Ericsson, Hughes/Alcatel, Lucent Technologies, Motorola, Nokia, and Nortel Networks) partnered with the NTC to complete the wireless to wireline Year 2000 interoperability testing. More detailed information on the NTC's Year 2000 testing activities, including descriptions of the tests that were executed and the test network configuration, may be found at the NTC website, <www.atis.org/atis/iitc/ntc/ntchom.html>. A detailed report describing the testing, the test results and any industry recommendations will be available in April.

The International Telecommunication Union (ITU) is conducting the final layer of testing. These tests are designed to ensure that Year 2000 remediation efforts in different countries are compatible and that international calling will not be disrupted or that problems associated with the Year 2000 rollover on one country's telecommunications system do not infect other telecommunication systems in other countries. Details of the status of ITU testing is reported in the International Communications section of this report on page 81.

Contingency Planning

Summary

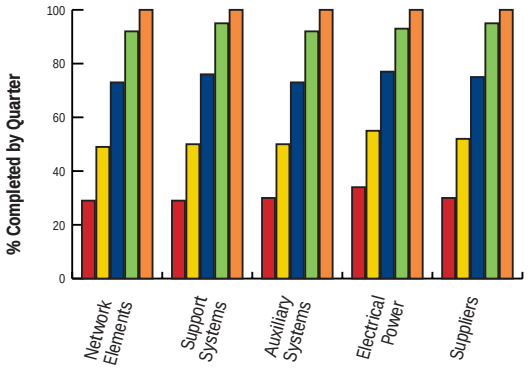
- Remediation and contingency planning are not substitutes for one another.
- Large carriers will report contingency planning progress through the NRIC in mid-April.
- Of the medium/small carriers included in the Commission survey, only 38 percent reported any contingency planning activity.
- Reporting carriers in the Commission survey plan to complete only approximately half of their contingency planning by the end of the 1st quarter 1999.



	Network Elements	Support Systems	Auxiliary Systems	Electrical Power	Suppliers
Completed*	42%	45%	37%	45%	36%
1st Qtr 99	72%	76%	69%	76%	69%
2nd Qtr 99	93%	93%	89%	92%	88%
3rd Qtr 99	99%	99%	97%	99%	99%
4th Qtr 99	100%	100%	100%	100%	100%

*prior to 1/1/99

Figure 14. Probability of Failure and Risk — Medium/Small Telephone Co. Percent Complete



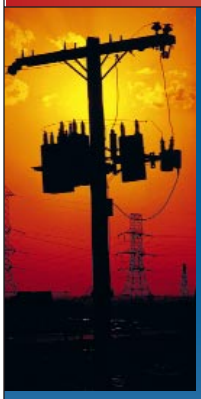
	Network Elements	Support Systems	Auxiliary Systems	Electrical Power	Suppliers
Completed*	29%	29%	30%	34%	30%
1st Qtr 99	49%	50%	50%	55%	52%
2nd Qtr 99	73%	76%	73%	77%	75%
3rd Qtr 99	92%	95%	92%	93%	95%
4th Qtr 99	100%	100%	100%	100%	100%

*prior to 1/1/99

Figure 15. Contingency Planning — Medium/Small Telephone Co. Percent Complete

NRIC defines "contingency planning" as "the development of a documented plan that provides for alternative procedures to deliver the minimum acceptable level of output for a specific/unique business disruption or risk that is known and often time-bounded (e.g., work stoppage, millennium change, and Euro conversion)." Remediation and contingency planning are not substitutes for one another; rather, both comprise critical and complementary elements in any well-planned process for Year 2000 transition.

The large local and long distance carriers have indicated to us that they are in the process of developing very comprehensive and complete contingency plans. While precise completion dates have not been reported, we have been in constant contact with NRIC on this question. Based on the informal reports we have received, we believe that the largest carriers will complete their contingency plans by mid-year. NRIC will provide a full report on the status of the large carriers' progress at their April 14, 1999 meeting.



For the medium/small local telephone companies included in the Commission analysis, only 38 percent report having begun contingency planning activities, 57 percent indicated that they have no contingency plans, and 5 percent did not respond to the question. Comments by several of these carriers further suggest that their contingency planning tends to focus on developing backups for switching and billing activities. The progress reporting that carriers have made on their risk assessment and contingency planning is shown in Figures 14 and 15.

As the charts show, approximately half of the planning by the medium/small carriers will be completed by the end of the 1st quarter of 1999. Because such plans are necessary to ensure continuity of operations, delaying a large share of contingency planning well into 1999 may be problematic.

We emphasize that there is no assurance against random Year 2000 disruptions, despite the thorough and deliberate remediation efforts any entity may undertake. It is simply not possible to foresee all points of disruption from Year 2000 problems; moreover, Year 2000 disruptions may come from more than a single point-of-failure. Therefore, it is essential that all carriers and users of telecommunications services (as well as manufacturers) develop comprehensive contingency plans to ensure that business operations are not adversely impacted by Year 2000 disruptions, and that, if any problems do occur, recovery is accomplished as promptly as possible. Also, as previously noted, there are a number of other critical dates or "event horizons" both prior to, and in addition to, the rollover to January 1, 2000, and these may require action earlier than otherwise expected. See Partial List of Problem Dates, page 122.

Consumer Tips

- Try to place important phone calls, particularly those overseas, before or after New Year's Day.
- Minimize phone use on that day (including modems). Heightened traffic volume could over tax the network.
- Have at least one phone available that does not rely on electric power to operate. Cordless phones normally do not work without a separate power source.
- If problems are encountered with an urgent call, wait several minutes before re-attempting the call. If a problem remains after a second attempt, try a different telephone to complete the call. If these problems persist, check with neighbors to see if they can assist with an urgent call.
- If you encounter a problem with your wireline phone, try a PCS or cellular phone. Be sure to check the battery.
- Don't worry and enjoy your New Year's Day; any disruption in phone service is likely to be minor and temporary.

WIRELESS SERVICES

Summary

- Low response rate from the commercial wireless industry to the Commission survey makes general conclusions difficult. Low response is cause for concern and might indicate risk of malfunctions.
- Larger commercial wireless providers have implemented plans for fixing Year 2000 problems, but have more work to do.
- Only half of the smaller wireless providers have a Year 2000 plan. Therefore, contingency planning is most critical.

INTRODUCTION

The wireless communications community is the most diverse group in the communications sector. With over two million wireless licensees, the Commission has regulatory oversight over interests that range from the commercial services, such as cellular telephones, pagers, and radios used in taxis, to the use of radio equipment by state and local governments for public safety of life and property. In most parts of the country, about a half-dozen commercial carriers are providing wireless telecommunications service. Thus, if Y2K problems occur, alternative wireless service providers may be available to the general public.

This section focuses on commercial wireless services provided directly to the public and assesses their testing efforts, Y2K risks and contingency plans. Public safety communications used by police, fire, and emergency personnel are critical and are addressed in a separate Emergency Services Section to this Report. See page 90. This report does not assess Y2K readiness among the private wireless community. However, because of concerns about the Y2K readiness of all wireless entities, we have customized another survey that assesses the status of non-commercial wireless licensees. This should give a broader summary of the complete wireless industry's Y2K readiness.

We conclude that, in light of the poor response to our surveys by a large number of commercial wireless providers, especially smaller carriers, there is cause for concern about their Y2K preparedness, and possible associated risks to their customers. Because of this concern, the Commission is contacting companies again and will continue to do so in an effort to get information about their Y2K preparedness.

COMMERCIAL WIRELESS TELECOMMUNICATIONS

Methodology of Assessment

The Commission conducted a survey that targeted a random sample of 300 commercial wireless entities, including licensees in the cellular service, personal communications services (PCS), specialized mobile radio services, and paging services. In addition, surveys were sent to the 12 largest carriers. Responses from the survey were collected in December 1998 and January 1999. For purposes of this report, operators that provide service to more than 500,000 customers are considered large carriers, and those that provide service to less than 500,000 customers are considered small carriers.

Thirty-one percent of all carriers surveyed provided responses to the survey. As a group, respondents provide service in every State and serve approximately 42 million customers. However, as of 1997, there were approximately 108 million commercial wireless subscribers. Thus, the responses received represent less than 40 percent of the entire wireless customer base. In view of this low response rate, the

Wireless Services

Commission has resurveyed those carriers who have not yet responded and will provide the results in future reports.

Assessment

Overview

The poor response rate may have many explanations. We have no choice, however, other than to classify the wireless sector as one at risk given the uncertainty of its efforts at this time. Both the Commission and CTIA repeatedly attempted to get better responses from carriers, but to no avail. Thus, we intend to increase our survey efforts and our education and awareness programs over the remainder of the year. These programs include seminars, mailings, additional surveys, and outreach programs through industry association programs.

We note that industry associations such as the Cellular Telephone Industry Association (CTIA) and the Personal Communications Industry Association (PCIA) are also assessing and facilitating Y2K remediation and preparedness efforts. In September 1998, CTIA released a report on the readiness of the cellular and PCS industries. This survey reported that wireless carriers in general have Y2K task forces in place and have a target date for completion of efforts of the second quarter of 1999. CTIA also reports that it is engaged in industry testing efforts in order to facilitate inter-network testing. The data collected from the Commission's survey efforts will be compared to the CTIA's Y2K Report (and any updates as a result of testing efforts).

According to PCIA, wireless carriers have made Y2K considerations an integral part of their network planning and operational activities for the past several years in light of the fact that PCS networks are new and messaging carriers are substantially expanding and upgrading their networks to support new, high-speed protocols and to make other technological improvements. As a result, PCIA reports that much of the plant in place was designed after the Y2K bug was identified and was Y2K compliant when deployed. It reports that many companies now require software and hardware vendors to certify Y2K compliance in purchase orders and contracts, and have programs in place to verify compliance. PCIA indicates that small carriers are working with the manufacturers to determine the extent of their Y2K problems. While encouraging, we note that the fact that the equipment is new is not a guarantee that it is Y2K compliant.

The Commission's Year 2000 survey revealed that approximately 54 percent of the total respondents, both large and small, have implemented a Year 2000 remediation plan or process (Figure 1). However, 100 percent of the large carrier respondents have a remediation plan. For these responding carriers, all will have remediation plans completed before December 1999 (see Figure 3).

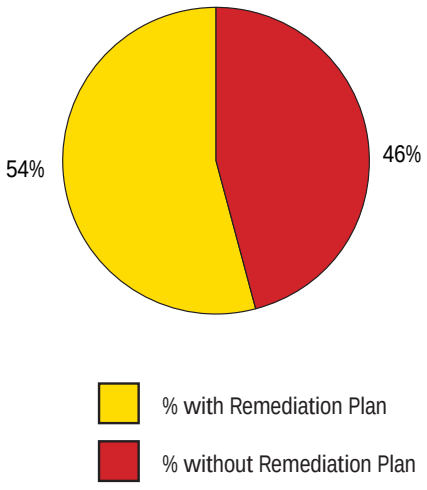


Figure 1. Total Responses

Given the low response rate and the late completion dates estimated, there is reason for concern. Greater effort should, therefore, be devoted to contingency or backup plans in the event of system malfunctions.

The results of the survey of commercial wireless licensees are summarized in the following two charts. Figure 2 (chart of all respondents) shows the percentages of completion of the various steps in the overall plan for fixing the Year 2000 problem, shown respectively by network elements, support systems, and auxiliary systems. Figure 3 shows the average estimated completion dates for the steps of the overall plan. The completion rates for network, support, and auxiliary systems range from a low of 28 percent to a high of 83 percent.

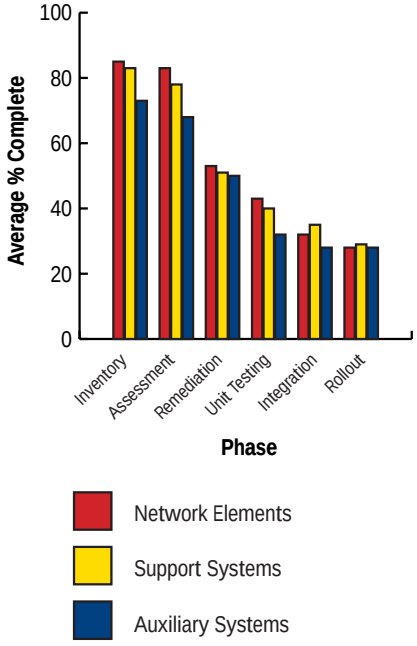


Figure 2.

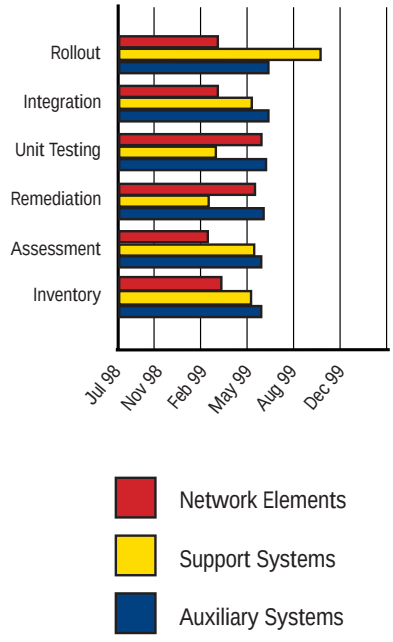


Figure 3.

Survey Responses by Size and Components

The following discussion reviews Year 2000 readiness results by size of the wireless carrier and by components of the overall wireless network. The charts below summarize results according to carrier size.

Network Elements

Network elements are defined as those systems, components, or software that directly affect communications transmission and reception, including:

- Data/messaging systems — Interface (interconnection) to the Public Switched Telephone Network (PSTN), transmitters, control transmitter, and subscriber/customer receivers or pagers.
- Mobile telephone systems — Wireless systems such as cellular, broadband PCS, and multi-channel base stations designed to provide radio telecommunications services to mobile stations. Examples of network elements are interfaced to the PSTN, base stations, cell sites, Mobile Telephone Switching Office (MTSO), microwave links, and subscriber units.

Wireless Services

Commercial wireless operators have focused primarily on mission critical network elements that may be adversely affected by Y2K problems and that ultimately may be responsible for disruptions of wireless services to their customers. The mobile switch located at the MTSO is the network element that could cause major disruptions to the two-way mobile systems if it fails due to Y2K problems. Mobile switches in the larger wireless systems have been upgraded periodically to increase capacity.

However, there is some concern for the smaller rural systems. They may still have their original switches since their customer base has not increased as rapidly as the customer base in the larger systems.

All large carrier respondents are currently implementing remediation plans for network systems. All network elements except for integration and rollout are over 65 percent complete (see Figure 4). All phases of the overall plan for large carriers are estimated to be completed by May 1999 on average (see Figure 5). Large entities that responded to the survey appear to be implementing a timely, practical plan. Small carriers that are implementing a remediation plan report on average that only the inventory phase and assessment phase are over 50 percent complete for network elements (see Figure 6). Therefore, it appears that small carriers are starting remediation implementation much later than larger carriers. However, small carriers estimate that they will be completed with network elements on average before July 1999 (see Figure 7). The main concern continues to be for those small carriers that were not implementing a remediation plan at the time of the survey.

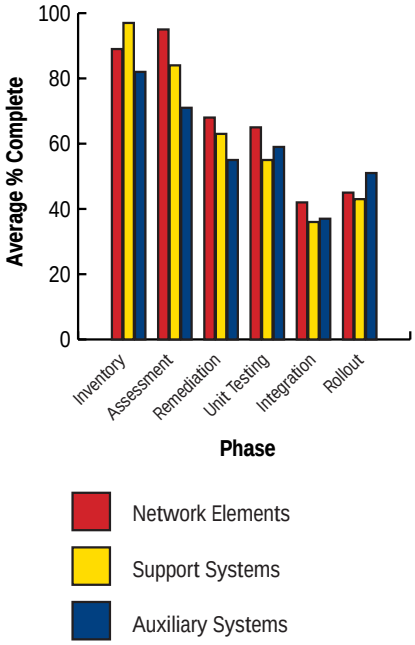


Figure 4.

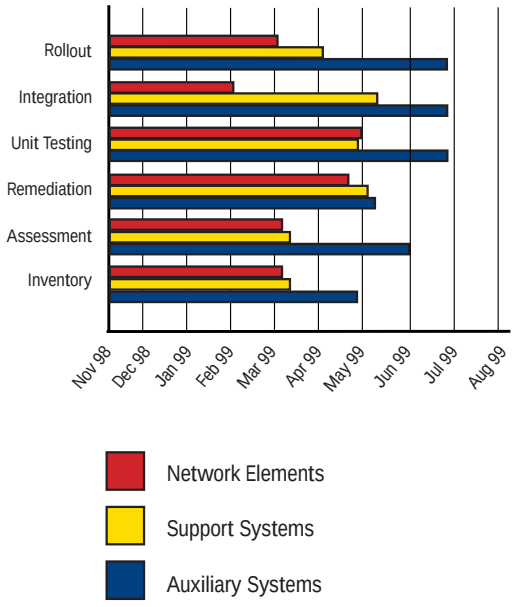


Figure 5.

Support Systems

Support systems are defined as operations support and administrative maintenance systems (such as maintenance support, billing, anti-fraud systems, parts ordering, primary power, and backup power). These systems provide important support functions such as operating power, access to and control of the call information to be used for the flow of important financial information, and system security. For

example, if the billing system fails, it may not allow calls by authorized subscribers to be completed. Failure of the anti-fraud systems may leave the network vulnerable.

All large carrier respondents are currently implementing a remediation plan. Large carriers appear to be making appropriate remediation plans for support systems. All support systems except for integration and rollout are over 50 percent complete (see Figure 4). All phases of the remediation lifecycle for large carriers are estimated to be completed, on average, by July 1999 (see Figure 5). Large carriers that responded to the survey appear to be implementing a timely and practical plan for support systems.

Small carriers that are implementing a remediation plan report on average that only the inventory phase and assessment phase are over 50 percent complete for support systems (see Figure 6). Therefore, it appears, again, that small carriers are starting remediation implementation much later than larger carriers. Support elements for small carriers will be completed on average before September 1999 (see Figure 7). This is a matter of concern — September 1999 is a very late date because unforeseen problems or delays can develop during each phase of remediation. However, the larger concern continues to be for those small carriers that were not implementing a remediation plan at the time of the survey.

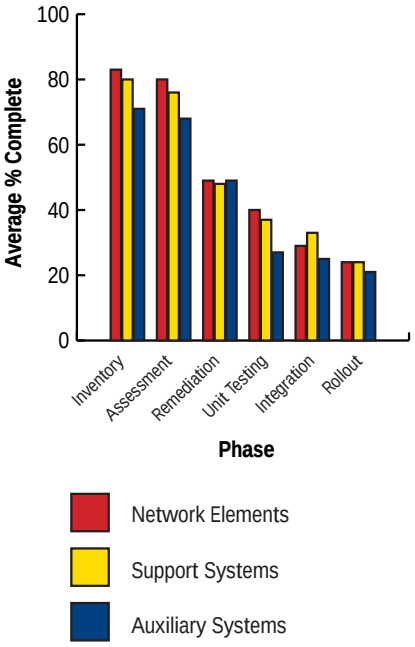


Figure 6.

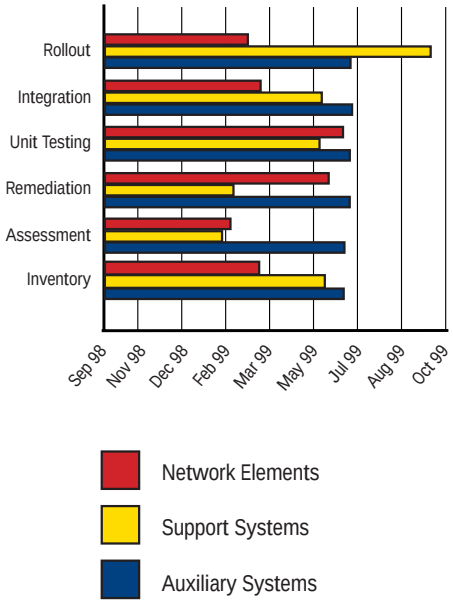


Figure 7.

Auxiliary Systems

Auxiliary systems or components include such items as payroll, human resources, backup systems (including auxiliary power supplies), security and alarm control systems, and environmental control systems (including heating, ventilation, and cooling systems). Although these systems are not directly involved in the processing of calls and financial or call-based data, failures could burden management of the commercial wireless system, and in the longer term lead to system performance problems. For example, a failure in one or more of the components, such as building access or air conditioning, could lead to the degradation of the system's ability to process calls over time.

All large carrier respondents are currently implementing a remediation plan. They appear to be making appropriate remediation plans for auxiliary systems. All auxiliary systems, except for the integration phase, are over 50 percent complete. All phases of the remediation lifecycle for auxiliary systems of large carriers are estimated to be completed, on average, by July 1999. Large carriers who responded to the survey appear to be implementing a timely and practical plan for auxiliary systems.

Small carriers that are implementing a remediation plan report on average that only the inventory and assessment phases are over 50 percent complete for auxiliary systems. Therefore, it appears that small carriers are starting remediation implementation much later than larger carriers. However, auxiliary elements for small carriers will be completed on average before July 1999. Small carriers may complete remediation plans faster due to the smaller size of the systems compared to the larger carrier system. Therefore, those small carriers that are implementing a remediation plan will likely be prepared for year 2000 with respect to auxiliary systems. However the main concern continues to be those small carriers that are not implementing a remediation plan at the time of the survey.

Additional Assessment Data

Based on the survey responses, it appears that a large portion of the wireless commercial industry is currently working with suppliers on Year 2000 issues. Eighty percent of the respondents indicated that they had done so, while only 9 percent indicated that they were not working with suppliers. (Eleven percent of the respondents did not answer this question.) Working with suppliers is a very important step to ensure operation through the critical date change and continued operation thereafter.

Overall, the responses indicate that the commercial wireless industry is satisfied with vendors and customers. Fifty-one percent of the responses to this question indicate moderate satisfaction, while 49 percent indicate that they are very satisfied with their vendors and customers. Vendors are a vital resource in the assessment of equipment and software. Vendors are often the only means to gain Year 2000 information concerning specific components of a system. Some of the respondents commented on the difficulties of outages lasting more than four or five days. Several respondents are concerned that the vendors do not have any sense of urgency in responding to Year 2000 inquiries.

The data collected appears to indicate that the wireless industry has the majority of the necessary resources to plan for the Year 2000. In response to the Commission's inquiry, over 73 percent did not indicate that they lacked any resource. Approximately 9 percent of the total respondents claimed a shortage in personnel, 16 percent in information, and 5 percent in monetary resources. Only a small number of respondents were more descriptive by stating that they need help with complete solutions.

Approximately 45 percent of the respondents have begun or plan to conduct joint testing with their customers and vendors, with some indicating that they are using contractors to conduct testing and complete remediation. We do not, however, have tangible test data to report. Forty-one percent of the respondents indicate that they are not doing joint testing and 14 percent of the respondents did not complete this question. The Telco Year 2000 Forum has been established to facilitate testing. This forum consists of labs and operators to assist in joint planned testing. More information concerning this forum can be found at their website at <www.telcoyear2000.org/primary.htm>.

Contingency Planning

Wireless networks are made-up of small, complex systems that work together to complete wireless communications tasks. It is difficult to predict the results of Year 2000 problems on these types of systems. Therefore, contingency planning — i.e., having backup plans in place in case something goes wrong — is an important step in becoming Year 2000 ready. According to the survey, approximately 42 percent of the respondents have begun contingency planning. The following analysis of contingency planning is broken down by size of carriers.

Large Carriers

Approximately 64 percent of large carriers surveyed have begun contingency planning. Those respondents that have begun to develop plans average less than 50 percent completion (see Figure 8). Large carriers' preparation of contingency plans average less than 40 percent for all elements (see Figure 8). Respondents' of analysis of risk and failure were to be completed on average by January 1999 except for network elements that will average completion by March 1999 (see Figure 9). Respondents' average completion for contingency preparation is April 1999 except for electric power with average completion in May 1999. However, those that are not implementing a contingency plan or assessment of probability of risk are of major concern.

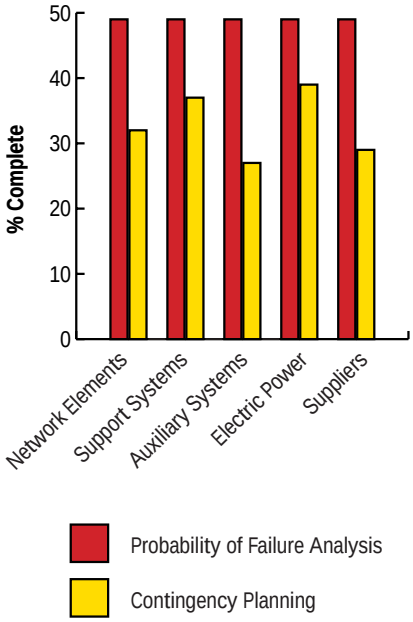


Figure 8.

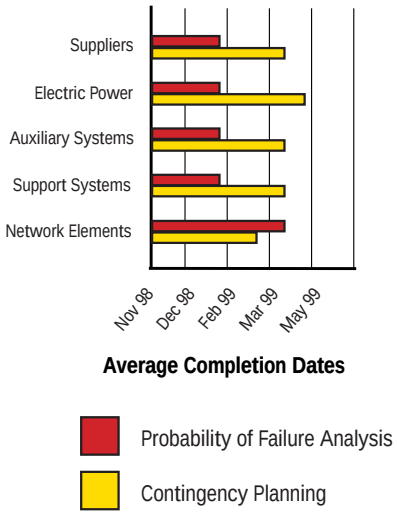


Figure 9.

Small Carriers

Only about 40 percent of the small carrier respondents have begun contingency planning. These respondents average about 70 percent completion of probability of risk assessment for all items (see Figure 10). Small carriers' preparation of contingency planning averages less than 50 percent for all items (see Figure 10). Respondents' average completion date for analysis of risk and failure is May 1999, except for suppliers, which have an average completion of April 1999 (see Figure 11). Respondents' average completion for contingency preparation is April 1999 for all phases (see Figure 11).

Wireless Services

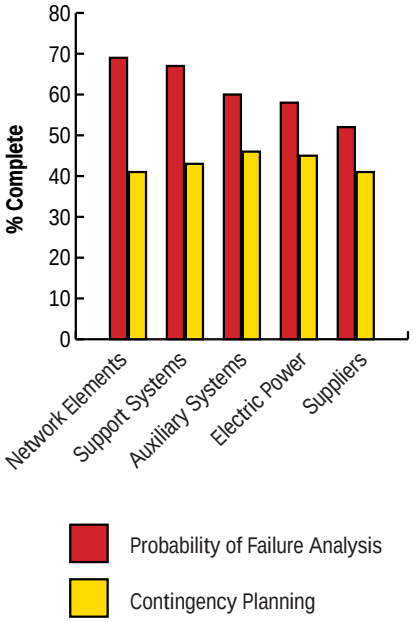


Figure 10.

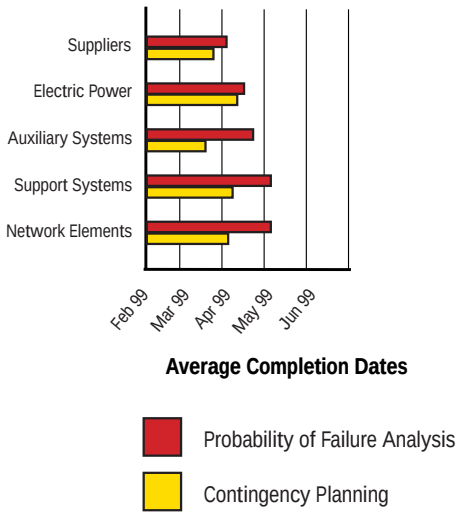


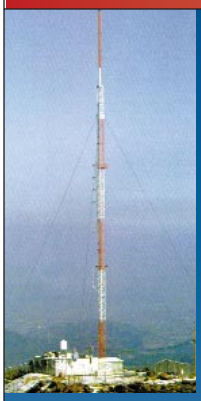
Figure 11.

Conclusions and Remaining Concerns

Commercial wireless licensees are strongly influenced by competitive pressures, including Y2K risks, and certain factors or concerns have emerged that potentially could affect a wireless licensee's own motivation and ability to deal with the Y2K problem. For example, cellular, PCS and paging providers would be influenced by related risks such as the loss of revenue, customers and reputation for reliability. While all large commercial wireless carriers that responded to the survey have implemented a Y2K remediation plan or process, only about half of the other operators serving less than a half-million customers have implemented such a plan. As the Commission has recognized from the beginning of this process, solutions for the Y2K problem have to come from the licensees themselves. The low response rate to the survey from wireless carriers, especially smaller carriers, may be cause for concern about their Y2K preparedness, and possible associated risks to their customers.

Consumer Tips

- Fully charge your wireless phone batteries prior to January 1, 2000.
- Contact your service provider to see if your equipment is Year 2000-ready.
- Not all wireless services will be a good alternative to wireline communications because of dependency on wireline communications. Call your wireless service provider to find out if your provider can be an alternative to wireline communication.
- Roaming (use of your wireless service outside of your home calling area) may be disrupted. Though the wireless system you directly subscribe to may not experience any disruptions to service due to Y2K, this does not necessarily mean the "roaming partners" your provider has made arrangements with will have the ability to provide the same disruptionless service.



Broadcast

BROADCAST

Summary

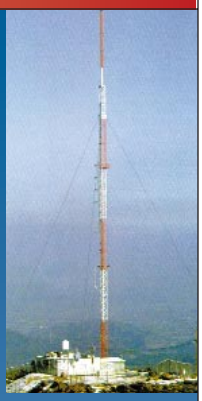
- Large, medium and small broadcasters are largely aware of the Y2K problem and are taking steps to ameliorate or eliminate its impact on broadcasting.
- Work is not yet complete and a significant amount of system integration and testing, in particular, remains to be done.
- Given the number of TV and radio stations available to most individuals, and the steps that broadcasters are taking, the public is at low risk of being without radio and TV broadcasts as a source of information.

INTRODUCTION

Virtually the entire population relies on radio and television for news, entertainment, and emergency information. Networks originate a good deal of television programming, which they typically distribute via satellite (see International Section, page 81) to their "affiliated" stations across the country, most of which they do not own. Individual stations also originate programming, whether or not they are affiliated with a national network, and buy programs from syndicators, who sell to individual stations and station groups. Some group owners that are not networks own large numbers of stations affiliated with various networks. As a result of their historical role of providing immediate information to the American people, and the fact that they are ubiquitous and can be received over-the-air for free, broadcast stations play a critical role in providing real-time information on problems, issues and emergencies. Of particular importance, broadcast stations participate in the Emergency Alert System, which brings national, state and local emergency messages to the public (see Emergency Services Section, page 90).

Accordingly, the Commission surveyed a representative sample of broadcast stations to determine their readiness to provide continuous service to the public. It is useful to note that, whereas most people have a limited number of communications links available, they have access to a multitude of broadcast stations. The American public is served by 1600 full power and 2100 low power television stations, augmented by 5000 "translator" (fill-in) stations and by 12,500 radio stations, with 3200 translators and boosters. The average household receives 13 television channels over the air. In the smallest markets, there are an average of four television and over eight radio channels available. This high level of redundancy means that in the event of individual station failures, the public would still be able to obtain information from alternative stations.

The National Association of Broadcasters (NAB), the industry's major national umbrella trade organization, has also been active in the Y2K sphere. It has put together several informational and educational initiatives as a resource for broadcaster efforts in Y2K compliance assessment, testing and remediation. The Association maintains an active website <www.nab.org/y2k/> that features original content and links to relevant sites around the web. Additionally, the NAB features Y2K sessions at its major industry meetings and conferences including at its last radio conference (October 14-17, 1998) and its next national convention (April 17-22, 1999). The national convention will feature a Y2K "Supersession" with FCC Commissioner Michael Powell as the keynote speaker. The Association has also participated in a number of state broadcasting association conference programs and NAB State Leadership Conferences to talk about Y2K issues in further support of its outreach efforts. Also, the Association of Local Television Stations has included in its



newsletters advice about the extent of potential problems and the need to not rely exclusively on vendors' assessments, as well as information regarding the FCC's and the NAB's Y2K websites.

Assessment

Methodology

The Commission contacted 230 broadcast licensees, owning among them in excess of 2600 stations, requesting that they complete the assessment questionnaire. The sample was designed to obtain responses from a cross-section of broadcast licensees. Both commercial and noncommercial radio and television stations were sent questionnaires.

The Mass Media Bureau first divided licensees into two categories — radio and television. Then it created four groups in each category. Each category had a "Large Group" consisting of all of the licensees listed in *Broadcasting and Cable Magazine*'s "Top 25," the top 20 licensees in terms of the number of stations, and the top 20 in terms of revenue. Each category also had a "Small Group" consisting of licensees having from 2 to 10 stations and an "Individual Group" consisting of licensees having a single station. Finally, each category had a "Noncommercial Group" consisting of licensees of noncommercial educational stations. Two-hundred and three licensees responded for a response rate of over 88 percent. The respondents were roughly equally divided among the categories.

Survey Results

For those licensees responding that they had a formalized process for addressing Y2K (representing 53 percent of stations covered by the survey), 50 percent estimated that they will have completed remediation and unit testing of their broadcast elements and their auxiliary systems by the end of March 1999. Seventy-three percent will be completed with these phases by June 1999, and 93 percent by September 1999, with the remainder concluding in October and November 1999. See Figure 1.

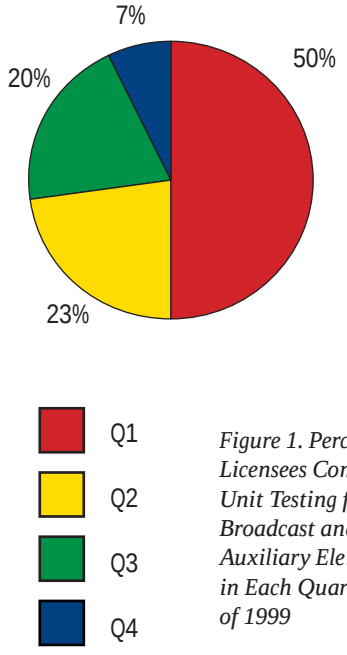
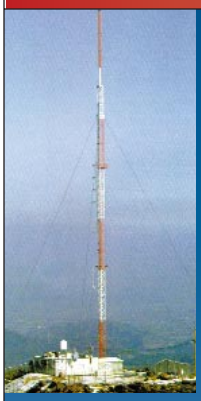


Figure 1. Percent Licensees Completing Unit Testing for Broadcast and Auxiliary Elements in Each Quarter of 1999

In order to better understand each way that our survey measured preparedness, the following discussion reviews the readiness of the industry by category, and further analyzes the data by size of the broadcasting entity.

Broadcast Elements

Broadcast elements consist of all parts of the radio or television station's transmission system. These include the studio and the antenna, and encompass, for example, cameras, CD and tape cartridge machines, control boards, and studio-transmitter



Broadcast

links. The data submitted indicate the responding licensees are on average 88 percent complete with the inventory phase and 82 percent complete with the assessment phase for broadcast elements (see Figure 2). However, responding broadcasters are only 56 percent complete with the remediation phase, 53 percent complete for unit testing, and 43 percent complete for integration testing with respect to these elements. However, the average expected completion date for remediation, unit testing, and integrated testing is April 1999. Responding broadcasters are on average 33 percent complete with roll out for broadcast elements. Larger licensees, which typically would be those most likely to engage in the rollout phase are, are on average 41 percent complete with this phase with an average expected completion date is April 1999. See Figure 3 for complete data on phase completion dates.

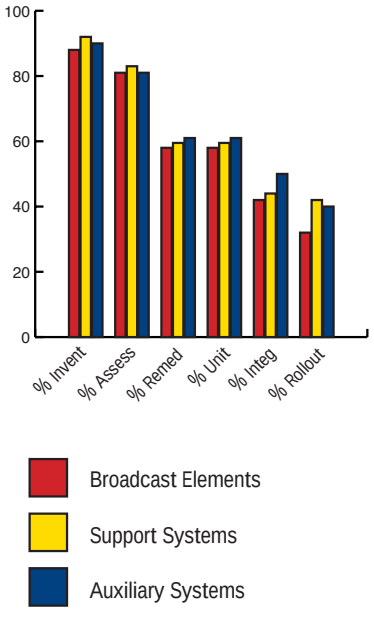


Figure 2. Percentage Complete — All Licensees

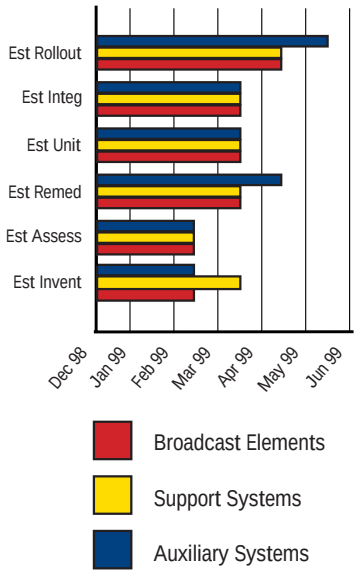


Figure 3. Estimated Completion Date — All Licensees

The survey responses were further broken down into three groups based on the number of licenses held by the licensee: small (1-2 licenses), medium (3-19 licenses), and large (20 or more licenses). With respect to broadcast elements, the large and small firms appear to be at similar stages of the process. Medium firms match the other groups for the first two phases—inventory and assessment—but are not as far along with respect to the other four phases (i.e., remediation, unit testing, integrated testing, and rollout). Complete data can be found in Figures 4, 5, and 6.

Broadcast elements have a direct and fundamental effect on the ability of the station to remain on the air and to provide news and emergency information to the public. If a station's transmitter fails, that station will not be able to broadcast. Fortunately, transmitters are essentially "dumb" devices that do not directly rely on computers for operation or control. Additionally, virtually all television stations and the vast majority of radio stations employ back-up transmitters.

There is an incidental concern related to antennas, and that is the safety lighting of their towers. If their lighting systems fail, antenna towers present a hazard to air navigation. This issue is fully discussed in the Tower Lighting Section. See page 100.

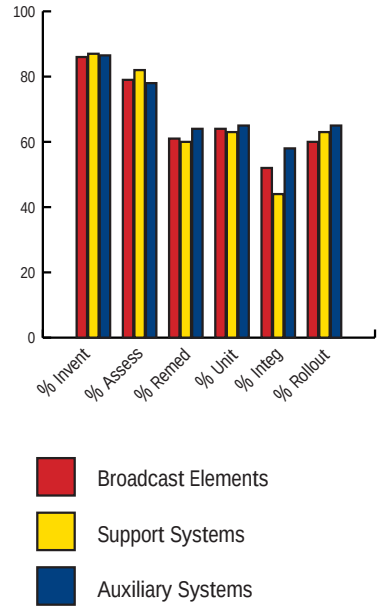


Figure 4. Percentage Complete — Small Licensees

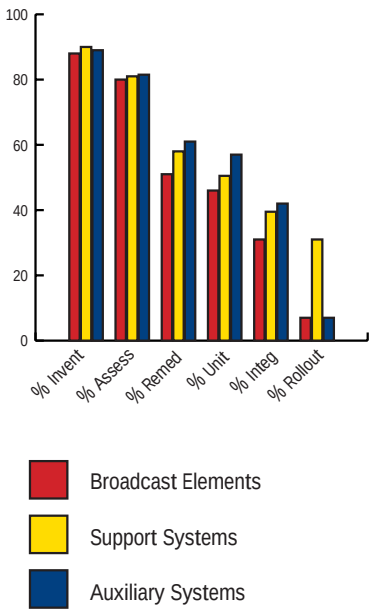
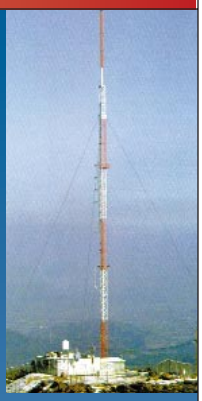


Figure 5. Percentage Complete — Medium Licensees



Support Systems

Support systems for broadcasters include station operation and control, support, maintenance, billing, and parts ordering. Many of these may be computer-related or controlled. The data submitted indicate that, with respect to support systems, responding stations are 92 percent complete with inventory, 86 percent complete with assessment, 59 percent complete with remediation, 58 percent complete with testing, only 46 percent complete with integrated testing, and 44 percent complete with rollout. See Figures 2 and 3. The average expected completion dates range from March 1999 for assessment through June 1999 for rollout. When broken down by the size of the licensee, the medium group again trails the other two groups in the final four phases. See Figures 7, 8, and 9.

Support systems are important to broadcasters. For example, traffic/program scheduling and billing functions may utilize date-sensitive computers. Should computers fail that have a trafficking or program scheduling function, programming and advertisements may not be inserted or, if inserted, may be broadcast at incorrect times. Network feeds or scheduled entertainment (e.g., music rotation scheduled by computer) may be missed or disrupted. In the long term, failure of billing systems may jeopardize receipt of station revenue threatening a station's ability to pay its employees,

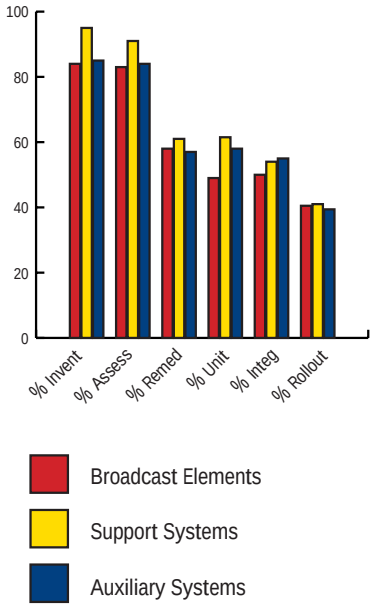
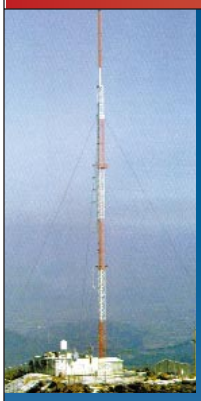


Figure 6. Percentage Complete — Large Licensees



Broadcast

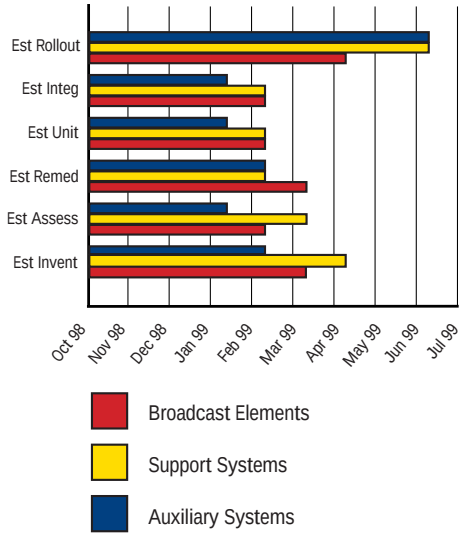


Figure 7. Estimated Completion Date — Small Licensees

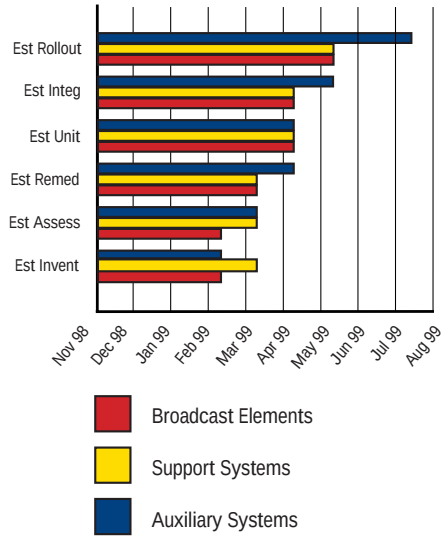


Figure 8. Estimated Completion Date — Medium Licensees

vendors and suppliers. Also, many broadcast stations, both radio and television, utilize satellite delivered programming which, in turn, is affected by proper computer functioning. If Y2K disrupts the programming input path, such as by causing a satellite to cease operation, it can deprive the station of its general programming schedule. To the extent that maintenance and parts are scheduled or ordered with the use of computers, Y2K induced failures could result in maintenance not being performed and parts not being ordered, potentially jeopardizing a station's ability to operate over the longer term.

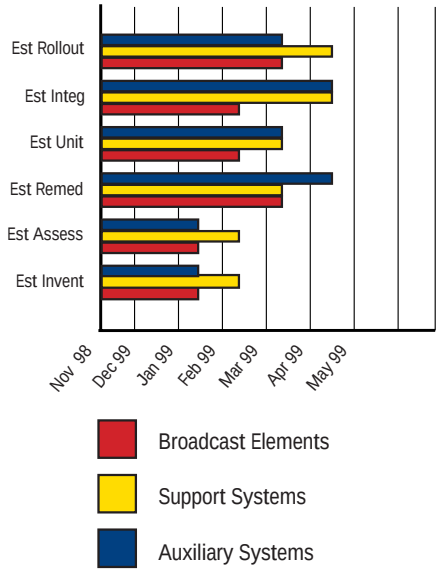
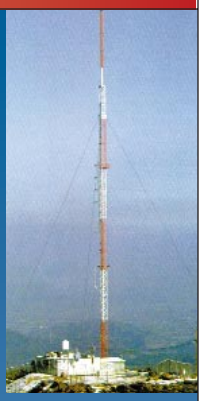


Figure 9. Estimated Completion Date — Large Licensees

Any support system failure could have a significant effect on station operations of a short- or long-term nature. Fortunately, many of these functions can be easily overridden or performed manually. Satellite delivered programming can be replaced by the same programming switched to working satellites, other programming delivered by functioning satellites, taped programming or live local talent; traffic and program schedules can be done by hand, as can be billing and bill payment. Thus, the level of risk is mitigated by the ability to employ alternative systems.



Auxiliary Systems

Auxiliary systems include payroll, human resources, backup (including auxiliary power supplies), security, and environmental control (including heating, ventilation, and cooling). The responding broadcasters indicate that they are 90 percent complete with the inventory phase for auxiliary systems and 82 percent complete with assessment. Remediation is, again, on average 62 percent complete with an average completion date of May 1999. Unit testing, however, is only on average 61 percent complete, with an average completion date of April 1999. Finally, integration testing is only on average 51 percent complete with an average expected completion date of April 1999. See Figures 2 and 3. When broken down by group, medium-size licensees lag the other two only in the final two phases of auxiliary systems, integration and rollout.

Failure of these systems can have a profound effect. For example, a failure of a station's environmental control system can allow heat buildup at the transmitter site leading to transmitter failure. Y2K induced problems with security systems can lock essential personnel out of the station's facilities. Accordingly, broadcasters must pay attention to these systems every bit as much as they do to systems that appear to have a more direct connection to broadcasting.

Contingency Planning

The data received indicates that responding broadcasters were on average 72 percent complete with their evaluation of the probability of failure of broadcast elements with an average completion date of March 1999. See Figures 10 and 11. Responding broadcasters were on average 73 percent complete with failure assessment of their support systems and 74 percent complete with respect to auxiliary systems. Failure assessment for electrical power is 67 percent complete and 62 percent complete for

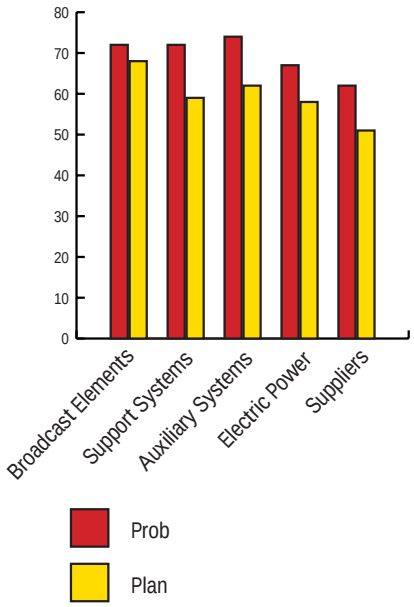


Figure 10. Contingency Planning Completion Rate — All Licensees

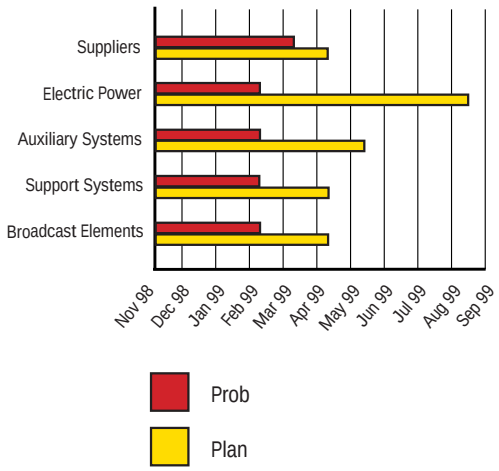
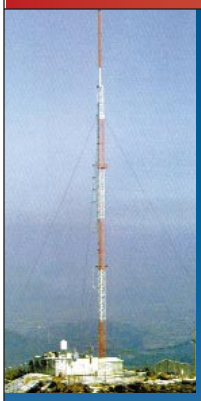


Figure 11. Contingency Planning Estimated Completion Date — All Licensees



Broadcast

suppliers. The average expected completion dates for these evaluations are March and April 1999, respectively. See Figure 11.

Respondents were on average 68 percent complete with contingency plans for broadcast elements with an average expected completion date of May 1999. Contingency planning with respect to support systems is, on the average, 60 percent complete; as to auxiliary systems it is, on average, 62 percent complete and the average completion date of contingency planning for support and auxiliary systems are May and June 1999, respectively. While contingency plans are only 59 percent complete with regard to electrical power, completion of this planning is expected to be completed by an average date of September 1999. Finally, contingency planning with respect to other suppliers is, on average, only 51 percent complete. See Figures 10 and 11.

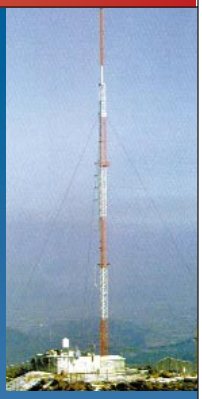
Conclusions and Remaining Concerns

Although individual station failures should not harm the public's ability to access information, we remain concerned with the present rate of remediation and that some individual broadcasters may not be adequately preparing for Y2K in time. We are attentive to the possible significance of the non-responses to our assessment and the readiness of those broadcasters. Accordingly, we are following up individually in order to elicit information from them, and will take additional steps as necessary to determine their Y2K readiness.

We are mindful that broadcast stations may suffer from Y2K incidents completely out of their control. We note that at our Emergency Preparedness Forum held November 16, 1998, broadcasters themselves recommended that stations have personnel present at the station over New Years Eve to guard against this and other eventualities.

We are also aware that in the smallest of markets, if local conditions prevent local stations from broadcasting, residents may only have access to broadcast signals originating from stations in neighboring communities. One prudent contingency plan is for these stations to be prepared to cover conditions particular to the community where broadcast service has failed.

It appears from data from the responding broadcasters that they are making progress toward Y2K readiness. We remain concerned, however, about those broadcasters that have failed to respond and have failed to adopt a formal remediation plan. Although we are encouraged that these broadcasters indicate that they are in contact with their vendors regarding the Y2K readiness of their equipment and generally show awareness regarding Y2K, it is difficult to judge how far along they are in the process, or when they are likely to be finished. We also are concerned about the ability of even the smallest broadcaster to adequately address Y2K without a step-by-step plan that ensures that every critical system has been reviewed. Even with these concerns, we recognize that the public's possible loss of service from an individual broadcaster due to its lack of Y2K readiness will be mitigated by the large number broadcast signals available to most citizens.



Broadcast

Consumer Tips

- Radio and TV are important sources of information about news, weather, and emergency situations. Consider having a battery operated radio or TV along with sufficient batteries.
- If a station suffers technical difficulties, consider tuning to another station for information, preferably one that broadcasts from your local area.
- If you use your VCR tuner to change stations on your TV set, know how to bypass the VCR in case it has technical problems.
- Have a television antenna handy for the reception of over-the-air television signals in the event that your cable system has difficulties.

CABLE SERVICES

Summary

- Most cable system operations are not expected to be crippled by Y2K.
- Large- and medium-sized MSOs, who serve over 80 percent of the nation's cable subscribers, will suffer only limited Y2K problems because they have been at the forefront of remedying their systems.
- Small MSOs and small operators are more likely to experience scattered cable outages because they often lack the large MSOs' resources and access to information.

INTRODUCTION

The cable industry delivers video and other programming to over 65 million subscribers throughout the country and its territories. Cable television signals are delivered via coaxial cable (or a combination of optical fiber and coaxial cable) directly to the home. The signals deliver content imported from a variety of sources, including broadcast signals and satellite programming. In addition, cable systems may originate their own programming. Cable television operators are also in the midst of developing and deploying advanced services such as digital video, high speed data delivery and internet access, and cable telephony. Thus, the industry must play an important role in minimizing Y2K concerns.

The Cable section of this report (1) describes cable systems and the impact of Y2K; (2) assesses industry readiness of large, medium and small operators; (3) reviews contingency planning efforts; and (4) discusses industry efforts, including testing.

THE CABLE SYSTEM

This section discusses the elements of a cable system that pose potential Y2K problems by partitioning the affected elements into three categories: network elements, support systems, and auxiliary systems.

Network Elements

Network elements are defined as those systems, components, or software that directly affect communications transmission and reception. Examples of network elements are controllers, ad insertion equipment, converters, scramblers, encoders, computer switches, routers, amplifiers, and addressable set-top boxes. Cable operators have focused primarily on network elements, which are often designated as mission critical items, since Y2K problems with a network component could affect the delivery of cable service to subscribers. Most two-way services, such as cable modems and cable telephony, are not expected to have disruptions because the equipment used was developed recently and is likely to have considered the implications of Y2K. However, we recognize that the newness of the equipment does not guarantee that it is Y2K ready.

A cable system's operations are usually controlled from its headend; thus, it is the focus of our concern. For the purposes of this report, a cable system's network elements may generally be divided into three categories: elements that (1) receive cable television signals from outside sources, (2) process these signals into cable channels, and (3) deliver cable channels to the cable subscriber.

Headend Reception of Cable Television Signals

A headend receives the majority of its video signals from three main sources: broadcast television stations, satellite programming providers and producers of locally originated programming. We generally concur with the Cable Television Laboratories, Inc. (CableLabs) and the National Cable Television Association's (NCTA) assessment that broadcast signals are not received with equipment that raises Y2K concerns. Satellite programming, however, poses concerns because its transmission to the satellite depends on automated video playback equipment that is sometimes outdated and requires software updates. The companion satellite reception equipment at the headend may be affected as well. Finally, locally originated programming is generally not automated and does not rely on time and dates.

Headend Processing of Cable Television Signals

Once these signals are received, they are passed on to signal processing equipment. The equipment used to process broadcast signals is generally not dependent on the date or time. Likewise, satellite-programming signal processing equipment does not depend on the date or time. However, premium satellite channels, such as HBO and Showtime, are scrambled when they arrive at the headend and must be unscrambled for further processing by the cable operator. Most of the time, these premium signals are then re-scrambled for delivery and descrambled at the subscriber's home. Some cable systems will also send the signals through automated equipment that switches among the various signals to feed a single cable channel. Many of these switches are not Y2K ready and must be upgraded. If a switch is not Y2K ready, then the signal will not pass through to the subscriber (see Attachment, Letter from NCTA, November 16, 1998, page 119).

A cable operator may also insert local commercials into satellite programming at the headend. Most commercial insertion equipment that is date and time sensitive will likely require substantial upgrades or replacement in order to be Y2K ready (see Attachment, page 119).

Delivery of Cable Television Channels

Cable channels are then transmitted through coaxial cable or a combination of optical fiber and coaxial cable to subscribers' homes. Signal amplifiers in the optical fiber and coaxial cable are not dependent on the time or date in order to transmit the signal. However, the signal amplifiers may contain control or testing devices, which are date and time sensitive, that monitor the condition of the system. Nevertheless, any failure of these devices will not likely interfere with signal distribution.

At the subscriber's home, cable set-top boxes perform certain functions as needed, such as processing a subscriber's request for a scrambled premium channel like HBO or a pay-per-view program. Although addressable set-top boxes are aware of the time and date, they do not have their own internal clocks, but rather are told the date by "addressable controllers" that are located at the headend. NCTA and CableLabs state that, according to manufacturers, no set-top box will need to be replaced, but some addressable controllers must be upgraded or replaced to be Y2K-ready. Some operators, including small cable operators and smaller MSOs, may use "non-addressable" set-tops that do not rely on software and accordingly do not pose Y2K problems.

Support Systems

Support systems are defined as operations support and administrative maintenance systems, such as maintenance, billing, parts ordering, and software for logging service calls/dispatching personnel. Customer Care Systems and testing equipment

are the two primary support system elements that potentially might pose Y2K problems. These two systems are areas of concern for the cable operator since problematic billing and testing could not only affect the customer but also affect the operator's revenue flow. First, Customer Care Systems process installation, disconnection and service repair calls as well as billing and account maintenance. Customer Care Systems also interact with Automated Response Unit (ARU) systems to process service orders and to send commands to addressable controllers for pay-per-view and unscrambling of premium channels. These systems may require Y2K compliance upgrades (see Attachment, page 119). Additionally, customer support systems that use retail personal computers (PCs) and popular software programs may also require upgrades or replacements. However, some small cable operators still prepare their bills and maintain their accounts manually and thus will not have any Y2K problems with their billing.

Second, testing equipment and monitoring devices potentially have Y2K problems because they are often date and time sensitive. Their failure could lengthen the time it takes for a cable operator to locate the source of outages that may or may not be related to Y2K, and therefore may delay any needed repairs.

Auxiliary Systems

Auxiliary systems are defined as systems or components such as payroll, human resources, backup systems, security and alarm control systems, and environmental control systems. According to NCTA, failure of auxiliary systems may be an "inconvenience" to the cable operator and its employees, but will not likely disrupt service to cable subscribers (see Attachment, page 119). However, as noted earlier, failure of air conditioning systems may cause a network element that overheats to fail. Furthermore, building security, such as locks or passwords or other environmental control mechanisms also require review for Y2K related problems.

The Assessment

Methodology

The FCC survey targeted 50 cable operators that serve approximately 88 percent of the nation's 65,400,000 cable subscribers. Subscriber counts were based on information obtained from Warren Publishing's 1998 Cable Television Fact Book and NCTA's "Cable Television Developments-Spring 1998." The total number of cable subscribers was obtained from the Commission's Fifth Annual Report, In re Annual Assessment of the Status of Competition in Markets for the Delivery of Video Programming, CS Docket No. 98-102, Table C-1 (rel. Dec. 23, 1998). The cable operators selected included 20 large multiple system operators (MSOs), 7 medium-sized MSOs, and 23 small MSOs and individual operators from rural and low population areas, with one operator serving communities in Puerto Rico. The response rate to our survey was 96 percent. In addition, the Commission received responses from 28 cable operators who voluntarily submitted information to the questionnaire. Information from the additional responses was included in the aggregate data.

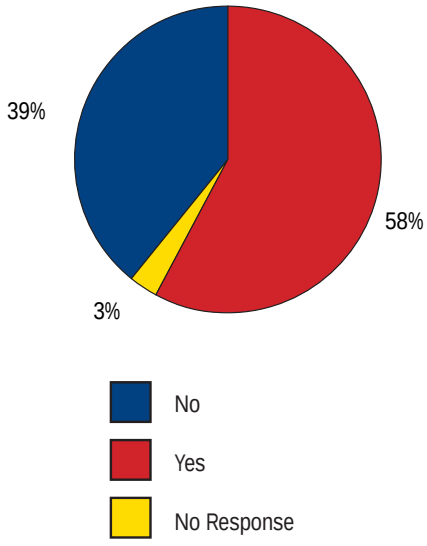


Figure 1. Percent Respondents with Formal Y2K Remediation Plan

Overview

The Y2K questionnaire revealed that approximately 60 percent of the respondents have implemented a formal Y2K remediation plan or process (see Figure 1). The remaining respondents have not initiated a formal process or indicate that they are addressing Y2K concerns as they arise or as part of regularly scheduled system upgrades.

The charts found in this report reveal average percentages of completion and average completion dates across all respondents of the survey. Each phase is broken down into network elements, support systems and auxiliary systems. The Emergency Alert System (EAS) will be discussed in the Emergency Services section (see page 90). These categories were defined and explained in detail in the Cable System Discussion section of this report.

As Figures 2 and 3 show, the respondents who have devised a formal process for managing Y2K remediation efforts, have completed, on average, over 90 percent of the inventory and around 80 percent of the assessment stages for network elements. Final inventory and assessment is expected to conclude by March 1999. However, only half of the remediation phase and approximately one-third of the testing and rollout phases have been completed. Rollout of network elements is expected to conclude by August 1999. With regard to support systems, as Figure 3 shows, the inventory and assessment stages are close to completion by March 1999. The remediation, testing, and rollout phases are less than 50 percent complete, with an anticipated compliance date of August 1999 (see Figures 2 and 3). As for auxiliary systems, like network elements and support systems, the inventory and assessment stages of auxiliary systems are near completion. Figures 2 and 3 also indicate that remediation, testing, and rollout phases are hovering around 50 percent or less complete. These systems are also expected to come into Y2K compliance by August 1999.

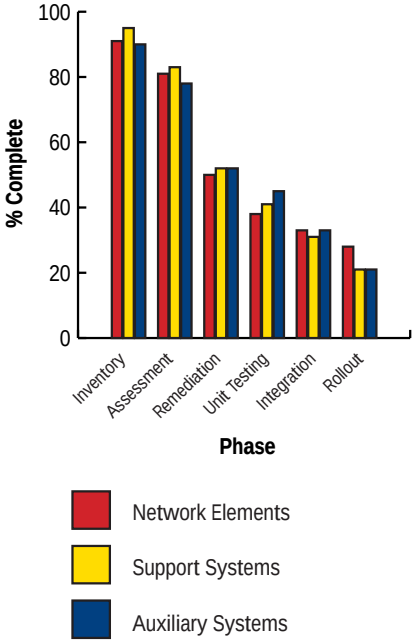


Figure 2. Average Percent Complete

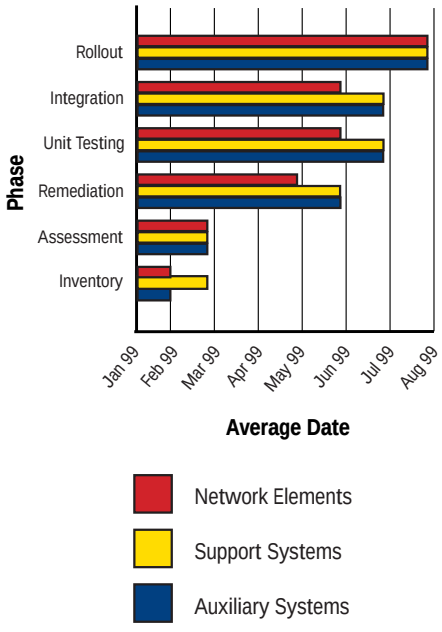


Figure 3. Average Estimated Completion Dates

Cable Services

Assessment by Size of Operator

The following section analyzes the industry's survey data by cable operator size: large MSOs, medium-sized MSOs, and small operators.

Cable Operator Size Definitions

- Large MSOs ranged from approximately 240,000 to 12.4 million subscribers with a median of 1,108,549 subscribers.
- Medium-sized MSOs ranged from approximately 54,000 to 175,000 subscribers with a median of 125,396 subscribers.
- Small MSOs and small operators ranged from 169 to 44,800 subscribers with a median of 1835 subscribers.

Large MSOs

According to subscriber counts provided in the survey, the large MSO respondents provide service to approximately 82 percent of the country's cable subscribers. Large cable operators have, on average, completed over three-quarters of their inventory and assessment phases and expect to conclude by April 1999 (see Figures 4 and 5). The remediation, testing and rollout stages are less than 50 percent complete and are scheduled to conclude by August 1999. As for risk assessment, large MSOs are averaging near 70 percent (see Figures 6 and 7). Finally, contingency planning is near 40 percent complete and has an average completion date of July 1999.

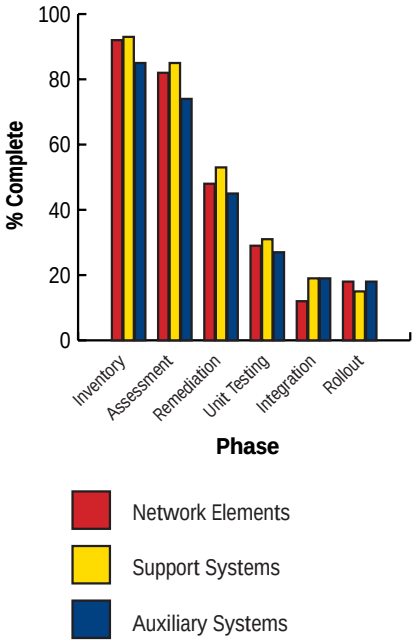


Figure 4. Average Percent Complete — Large Cable MSOs

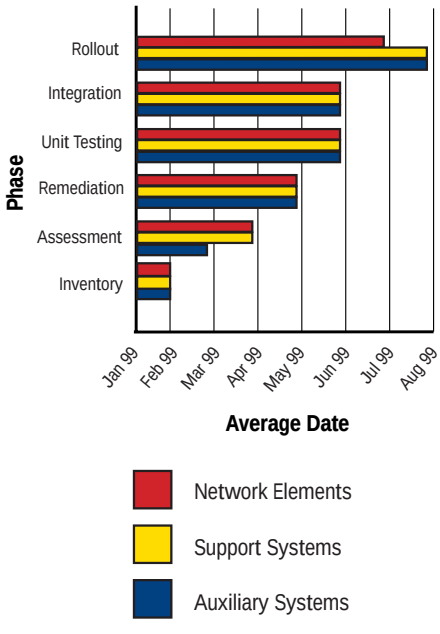


Figure 5. Average Estimated Completion Dates — Large Cable MSOs

Medium-sized MSOs

The mid-sized operators represented in this survey serve approximately 1.5 percent of cable subscribers. The medium MSOs who had initiated a formal process for Y2K remediation indicated that they had completed 100 percent of the inventory phase and over 90 percent of the assessment phase (see Figures 8 and 9). Remaining assessment on all systems had an average completion date of April 1999. However, the

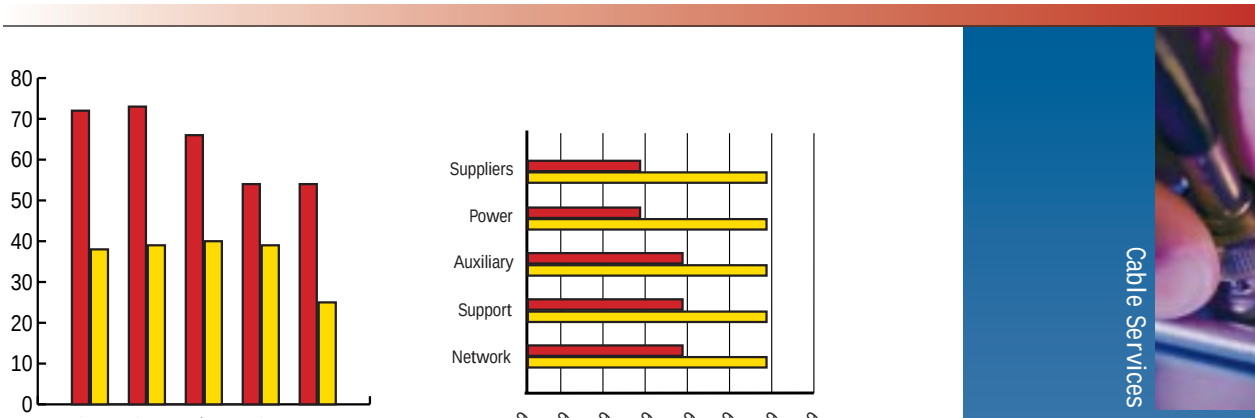


Figure 6. Contingency Planning — Large Cable MSOs

Figure 7. Contingency Planning — Large Cable MSOs

integration testing and the rollout phases are less than one-half complete, with an expected conclusion date of August 1999. Medium-sized MSOs are optimistic regarding the probability of failure phase. On the other hand, mid-sized respondents are behind on contingency planning, with an anticipated completion date by April or June 1999 (see Figures 10 and 11).

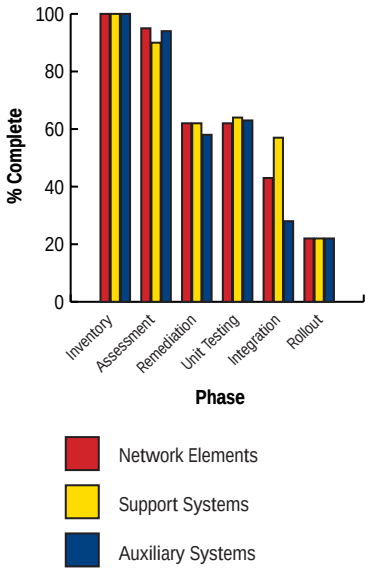


Figure 8. Average Percent Complete — Medium Cable MSOs

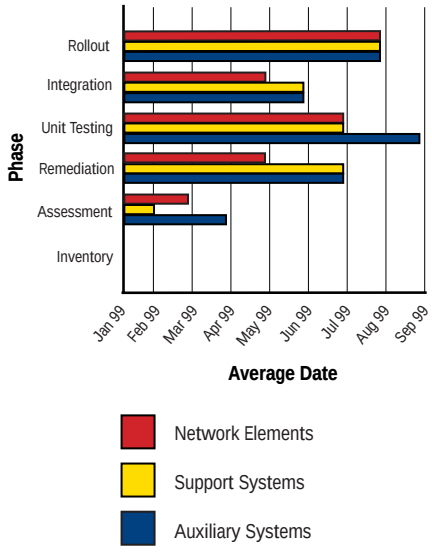


Figure 9. Average Estimated Completion Dates — Medium Cable MSOs

Small Operators

Combined, the small operators represented in the survey serve close to 0.5 percent of cable subscribers. As Figures 12 and 13 show, small cable operators have, on average, completed the majority of their inventory and assessment phases. The remediation and testing stages are primarily in the 40 and 50 percentiles with June and July

Cable Services

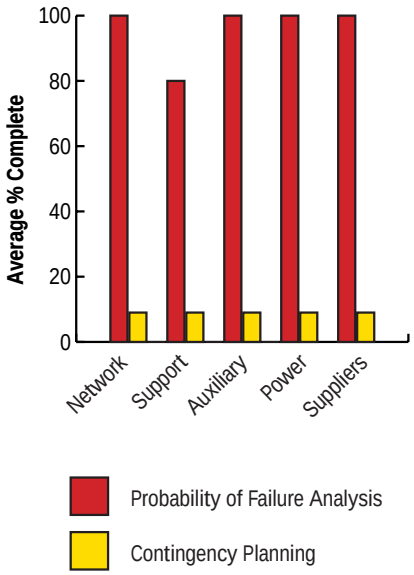


Figure 10. Contingency Planning — Medium Cable MSOs

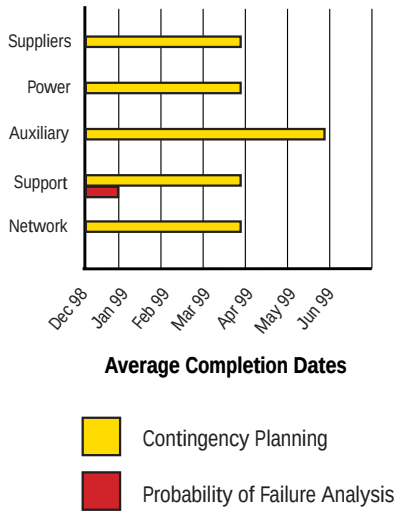


Figure 11. Contingency Planning — Medium Cable MSOs

1999 completion dates. Less than half of the rollout phase is complete, with an average completion date of October 1999. On the other hand, small cable operators were well along in analyzing the probability of failure and expect to conclude the risk assessment phase by April 1999 (see Figures 14 and 15). Among the three different size operators, small operators had the highest percentages in the contingency planning phase. Small operators anticipated an average completion date for contingency planning in July 1999.

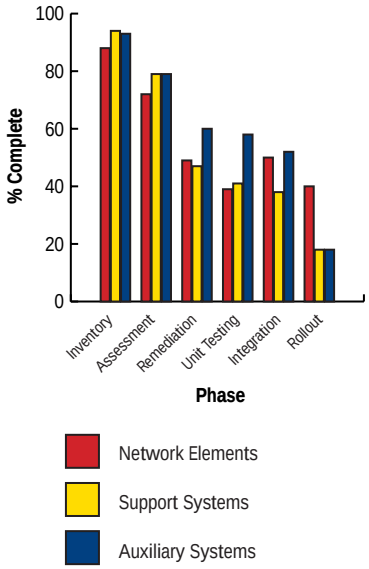


Figure 12. Average Percent Complete — Small Cable Operators

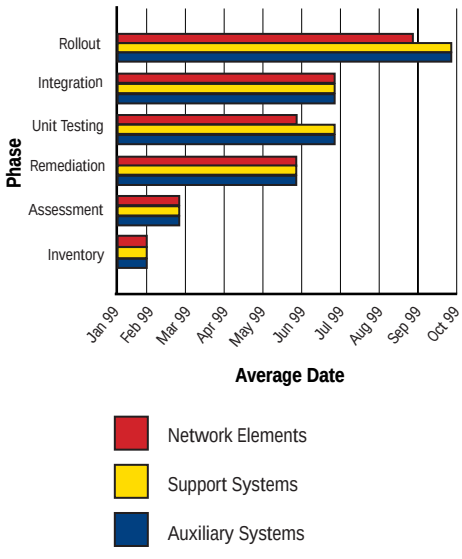


Figure 13. Average Estimated Completion Dates — Small Cable Operators

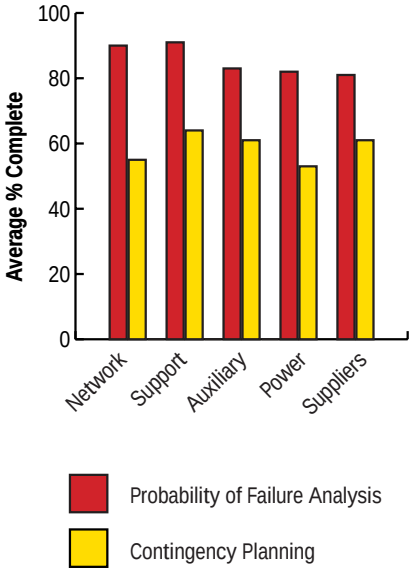


Figure 14. Contingency Planning — Small Cable Operators

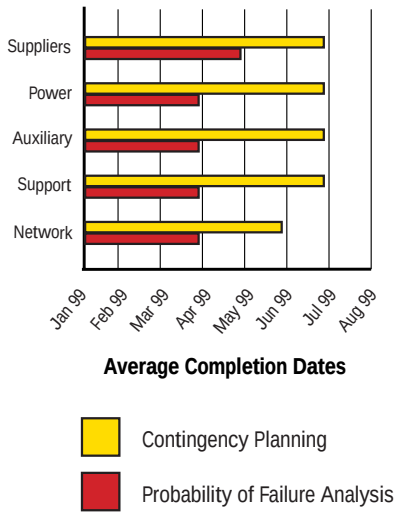


Figure 15. Contingency Planning — Small Cable Operators

As noted in the sections above, large and medium-sized operators expect to complete the rollout phase by August while small operators have an average target date of October 1999. Various small operators cite their limited resources and their inability to get an expedient response and delivery from their vendors as reasons for the delay in rollout. In addition to a lack of qualified personnel, the cost of Y2K compliance for the small operator is often much greater than the cost to large and medium-sized MSOs. Small operators, when combined, serve less than 1 percent of cable subscribers, yet they operate a large number of headends. As a result, they have a large quantity of equipment to be upgraded or replaced. Consequently, when measured in terms of subscribers per headend, the expense for the small operator is much greater than the expense for the large and medium-sized MSO.

Additional Assessment Data

The survey also queried whether the industry had adopted a standard definition for Y2K compliance, who cable operators were involved with on Y2K, the status of their interactions with their vendors and customers, the availability of resources, the status of joint testing initiatives, and whether cable operators encountered any unique problems during their Y2K remediation efforts. Survey results show an even split between operators who have and have not adopted an industry developed definition. The commonly chosen definitions were IEEE 2000.1, GSA, Bellcore, and the British Standard. However, the majority of operators chose to modify one of the above standards or create their own company standard.

Cable operators also commented on the Y2K preparedness of their business partners. Respondents asserted that the parties (e.g., other carriers, entities, or foreign countries) they were involved with were adequately addressing the Y2K problem and they do not anticipate any impact on their operations. Additionally, many cable operators are working with cable industry associations such as NCTA, CableLabs, the Cable Telecommunications Association ("CATA"), Small Cable Business Association ("SCBA"), state cable associations, their vendors, other cable companies, and other communication industry associations to share and obtain information regarding the Y2K problem.

Cable Services

Overall, the responses indicate moderate satisfaction in the interactions with vendors (see Figure 16). As Figure 17 illustrates, over 80 percent of the respondents have begun to work with their vendors in dealing with the Year 2000 problem. Many operators have contacted their vendors requesting the status of equipment, as well as verification that equipment is Y2K ready. Some operators are in the early stages of this process, starting with the most critical equipment vendors. Most of the operators are in the process of evaluating vendor responses, installing upgrades, or purchasing new equipment for replacement. Some respondents have contacted their banking partners and other suppliers such as billing and programming providers and evaluation is in progress.

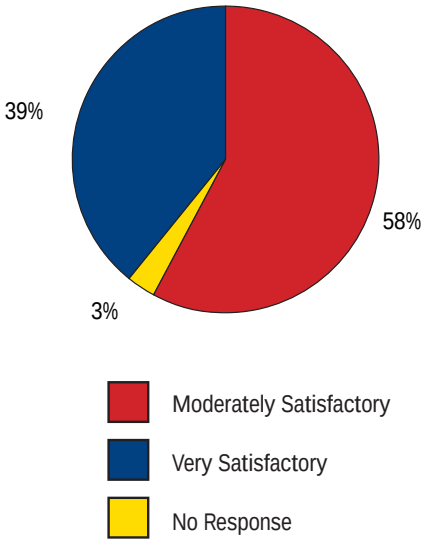


Figure 16. Satisfaction with Vendors

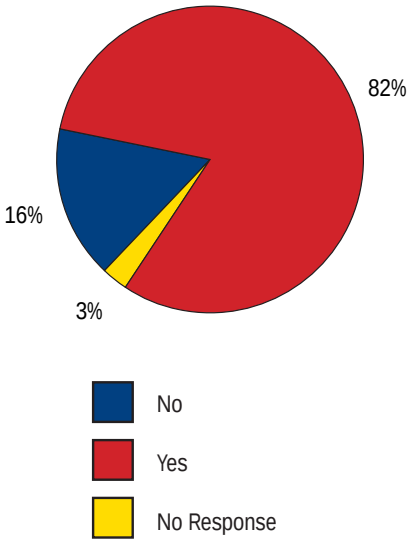


Figure 17. Percent Working with Vendors/Supply Chain

In response to the Commission's inquiry into the question of resources, over two-thirds of the respondents indicated that they do not lack information or resources (see Figure 18). Approximately 20 percent of the respondents claimed a shortage in personnel, 6 percent in information, and 4 percent in monetary resources. Many operators cited personnel as a concern because employees who are capable of addressing the Y2K problem are also tasked with performing technical support or maintaining normal cable operations. This situation is especially difficult for smaller operators who stated that since the year 2000 project is complex and time-consuming, it is a burden on their small staff. Other operators who have attempted to hire full time employees to address the Y2K problem cited the limited number of technically proficient and skilled personnel available in a highly competitive job market. As for lack of information, one respondent pointed to the reliance on information supplied by business associates and vendors as a potential problem due to the cable operator's lack of control. Other respondents referred to a difficulty in locating their vendor's Y2K personnel or obtaining a response from the vendor. Another respondent remarked that it was unable to find information on areas of concern related specifically to their own business. Finally, some operators mentioned that they may not have enough money to address all the Y2K problems that may arise.

Approximately 50 percent of the respondents have begun or plan on conducting joint testing with their customers and vendors. However, some operators are relying

solely on their vendors to conduct testing. Other operators have ongoing internal testing, primarily of mission critical items, and are assessing the need for interoperability testing. Many operators have set aside the first and second quarters of 1999 to begin joint testing, with completion dates set from June 1999 until the fourth quarter of 1999. Several operators are working with CableLabs, NCTA and the Society of Cable Telecommunications Engineers (SCTE) to help organize vendor integration testing. NCTA and CableLabs have indicated that they are facilitating a report for the cable industry on the results of the interoperability tests of addressable set-top controllers, ARUs, and Customer Care Systems. Conclusion of the interoperability tests and a report is expected by May 15, 1999.

In addition, the Commission asked respondents if they encountered any unique problems or circumstances in their Y2K remediation process. One concern was the delay in one vendor's release of equipment until the latter part of 1999. Another operator commented on the problem of custom-made, widely distributed customer premises equipment (CPE) no longer supported by the vendor. One respondent noted that acquisitions of cable systems which contained old, non-compliant equipment was a problem. A few operators mentioned their uncertainty regarding the status of video programming providers and satellite delivery systems.

Contingency Planning

According to the survey, approximately one-third of the respondents have started to develop contingency plans in the event of Y2K malfunctions (see Figure 19). The remaining two-thirds expect to initiate contingency planning at various times during 1999, with start dates from first quarter 1999 to third quarter 1999. Further, as Figures 20 and 21 show, the respondents with contingency plans in place had completion percentages close to 50 percent and anticipated concluding by July 1999. These respondents finished, on average, over three-quarters of the risk assessment of network elements, support systems and auxiliary systems. (For EAS contingency planning, see Emergency Services Section, page 90). The risk assessment phase is expected to come to a close by April 1999.

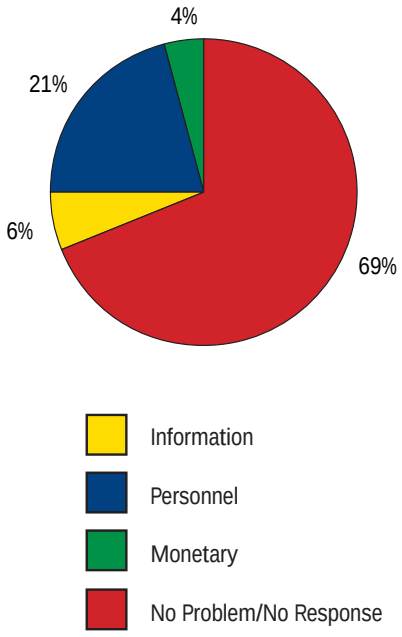


Figure 18. Percent Lack of Resources

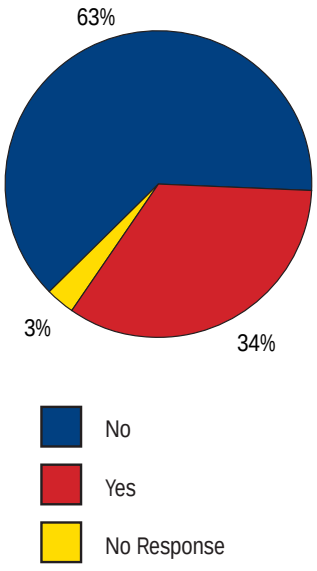


Figure 19. Percent Respondents with Contingency Plan

Cable Services

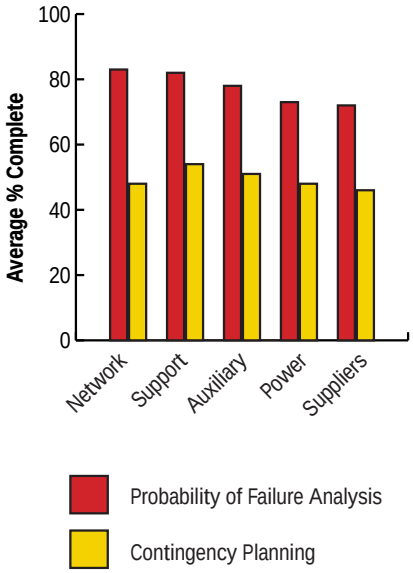


Figure 20. Contingency Planning

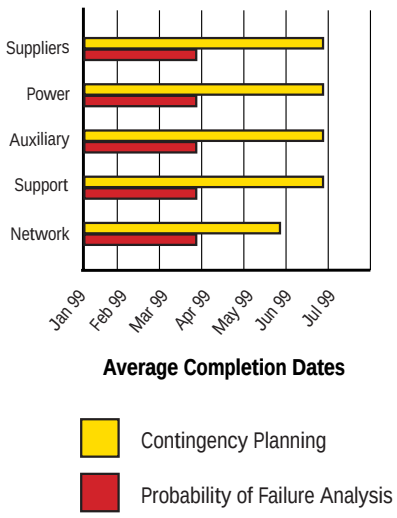


Figure 21. Contingency Planning

Additionally, NCTA and CableLabs have engaged an independent consulting organization to observe the testing scheduled to occur at several host cable operator locations. The consultant will also work with CableLabs to prepare a generic cable industry contingency plan. The contingency plan, to be completed by June 15, 1999, will act as a guideline for the industry and will address "cable operations," which is defined to include all areas affecting the operators' ability to deliver service.

Sources of Information in the Industry

The most significant repository of cable Y2K information is CableLabs, a research arm of the cable industry. CableLabs created a Y2K Working Group to collect information from cable operators as they assess, repair and test Y2K problematic equipment. In addition, in September 1998, CableLabs hosted a Year 2000 Vendors Symposium in Denver at which cable industry vendors, including representatives from addressable set-top box manufacturers, billing systems and headend component manufacturers, presented their Y2K plans. The vendors also discussed their testing and certification plans both publicly and privately in one-on-one conversations with cable operators. As data is collected from cable operators and its meetings, CableLabs posts information on problematic equipment and software, as well as, to the extent possible, solutions, behind the firewall on its website. All franchised cable operators are permitted access to this website.

CableLabs and NCTA have presented the Commission with general assessments of certain categories of cable equipment and software without identifying particular companies. In evaluating the information we received from CableLabs and NCTA, we also examined information received from the survey discussed above and separate meetings and discussions with MSOs, small cable operators, engineers, vendors and industry groups. In addition to individual meetings, last year we held a general cable forum at which cable operators, industry groups, equipment and software vendors, and video programmers attended. For a summary of the forum, see our Y2K web page at <www.fcc.gov/year2000>. We note, however, that no industry-wide

organization exists to independently test and verify a cable system's Y2K readiness and publish the results. In addition, we are not aware of any other reports on the cable industry's Y2K readiness.

According to NCTA and CableLabs, all Y2K problematic cable hardware and software have repair or replacement solutions. NCTA and CableLabs also state that there are new functional equivalents for old non-compliant hardware. In addition, because new addressable controllers use standard personal computers, the upgrade costs to the new controllers are modest. Based on their conversations with ARU and Customer Care System manufacturers, NCTA and CableLabs state that they are highly confident that Y2K upgrades for these systems will be available. NCTA and CableLabs also state that they are confident that the satellite video programmers will repair their video playback equipment in a timely manner. Finally, and most notably, NCTA and CableLabs state that broadcast signals are not dependent on time or date sensitive cable equipment and will be delivered to the subscriber.

Conclusion and Remaining Concerns

There are a few remaining concerns. Although the survey demonstrates that the largest MSOs plan to complete repairs and unit testing by June and July and have already completed most of their repairs, our survey indicates that many small operators have testing and rollout dates that extend through December 1999, leaving little margin of error for unforeseen trouble or unexpected test results. We are also concerned about respondents who did not have a formal process in place for addressing Y2K issues. An operator must conduct a thorough assessment of all systems. Without a formal plan of action, an operator risks an insufficient review that could fail to uncover all vulnerabilities. In addition, if an assessment is not initiated early enough, there may not be time to complete all steps before the year 2000 date roll over. Finally, we are concerned about the low level of interoperability testing that has been conducted to date. We are aware, however, that NCTA and CableLabs will fund interoperability testing of addressable controllers, Customer Care Systems, and ARUs.

Small cable operators have unique problems. Although small cable operators serve a relatively small percentage of the nation's cable subscribers, they carry a disproportionate Y2K burden because they operate a large majority of the nation's 11,000 headends. In addition, survey respondents also indicate that they sometimes lack necessary access to Y2K information, vendors, personnel and money. To assist small operators in assessing their Y2K readiness, the Commission is working with industry groups, such as SCBA, to disseminate Y2K information and to encourage small operators to contact CableLabs, where the small operators may take advantage of the large MSOs expertise.

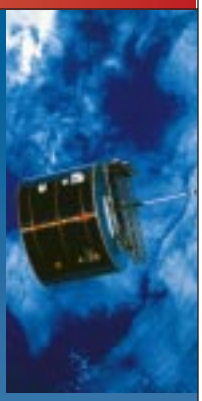
Our survey indicates that some small operators have had difficulty getting responses from their vendors to their inquiries. We are concerned about any disparity in the ability of large and small companies to obtain vendor fixes and will be watching this closely. Small cable operators are also concerned that, if Y2K ready addressable controllers are not available for the existing set-top boxes, they will be forced to purchase more expensive set-top boxes as well. For example, one small operator may need to purchase a new electronic system manager with an addressable controller that operates channel scramblers and pay-per-view, which can be very expensive. As many small operators serve less than five thousand subscribers, this could be a substantial expense. On the other hand, some small cable operators are ironically fortunate to have older equipment that is not time or date sensitive, such as non-addressable set-top controllers and manual billing systems.

Cable Services

While it is generally thought that Y2K problems will not cripple cable system operations, equipment such as switching devices, commercial insertion equipment, satellite video playback equipment, addressable controllers, ARUs and Customer Care Systems are at risk. Although we have received assurances that there are repairs or replacements (functional equivalents) for each piece of faulty software or hardware, we remain concerned that not all cable operators will be able to implement these repairs or replacements in time because of the disparity in readiness between large and small operators. Based on the information that we have received to date, it appears that the largest MSOs are at a low risk of suffering Y2K problems because they have been on the forefront of remedying their systems. Thus, the vast majority of cable subscribers who receive service from the large- and medium-sized MSOs are at a low risk of encountering problems. Smaller MSOs and small operators, which lack the larger MSOs' resources, access to information, and attention from key vendors, are at a higher risk of experiencing cable outages.

Consumer Tips

- A cable system is likely to function, except for scattered channel outages.
- Will not need to replace set-top boxes, but check with your cable operator.
- Have an antenna handy to ensure reception of over-the-air broadcast signals.
- If subscribing to cable internet or telephone service, ask your cable operator about Y2K compliance.
- For customer-owned electronic devices, such as TVs and VCRs, check with your electronic manufacturer.



Satellite & High Frequency Broadcast

Summary

- The industry consensus is that Y2K problems are unlikely to affect satellites now in orbit. However, there is some concern about earth stations and the interconnection of satellite gateways with public switched telephone networks, particularly abroad. Since earth stations serve as the link to multiple private as well as public terrestrial-based networks that may include date-dependant elements, these concerns are especially significant.
- Most respondents expect full compliance in all systems by September 1999. Respondents can be split into two groups: over 70 percent have a formal process for managing the Y2K problem, while under 30 percent do not have a formal process or are addressing problems simply as they arise.
- The small number of satellite corporations that have developed contingency plans is a concern.
- The respondent companies not commencing commercial service until after January 1, 2000, on the whole, recognized the severity of the Y2K problem. Some believe they have an advantage over existing systems in the hardware and software procurement process since they are purchasing, constructing, and integrating their systems in an environment of heightened sensitivity to Y2K issues.

Introduction

The Commission surveyed U.S. satellite operators and HF broadcasters concerning their Y2K readiness and contingency plans. The Commission has also undertaken a number of initiatives regarding the Y2K challenge. The Commission conducted three Y2K roundtables with the satellite, international, wireline and HF service providers that discussed challenges facing the industry and potential solutions as pertains to international services.

The Satellite Network

A satellite in orbit can communicate with users on the ground through various earth stations. These stations can be, for example, large earth stations for transmission and reception of video signals for broadcast or cable, earth stations connecting to the public telephone network, 18-inch rooftop receiving antennas for Direct Broadcast Satellite (DBS), rooftop receiving antennas at a convenience store as a part of a private Very Small Aperture Terminal (VSAT) network, or handsets or mobile transceivers for a Mobile Satellite Service (MSS).

For purposes of the Commission's assessment, the satellite networks were broken up into network elements, support systems, and auxiliary systems. Network Elements of a satellite system are defined as those system components (hardware and/or software) that directly affect satellite transmission and/or reception. The two major elements of a satellite system are earth stations and in-orbit satellites. An earth station is comprised of antennas, computers, modulators, high-power amplifiers, electric power bays, antenna pointing and drive systems, and up-converters, among other things. The satellite (often referred to as a "space station") has components that complement those on earth stations: down-converters, de-modulators, etc.

Both earth and space stations may rely upon date- and time-sensitive systems and processes through electronic switches and clocks, most of which require precise synchronization. Earth stations act as the connection to terrestrial networks and because of this functionality, earth stations may have increased vulnerability to Y2K anomalies. Operationally, a data, voice, or video signal is up-linked from an earth station, in a specified frequency band, to a designated space station. The signals are

then relayed through the space station to a single point, or to many points of reception around the world, including cable headends, broadcast stations, and homes.

Auxiliary systems are defined as systems or components such as payroll, human resources, backup systems, security and alarm control systems, and environmental control systems. The network control center (NCC), in satellite/earth station systems, is the key auxiliary component. A network control center is an assembly of administrative and technical devices, all interconnected through the dynamics of date and time.

Methodology

The Commission's survey targeted satellite operators that serve both individual and business users. Surveys were sent to both current and start-up service operators including all participants of the July 1998 Commission roundtable. These included Fixed Satellite Service (FSS) operators, MSS operators in the Big and Little Low Earth Orbit (LEO) bands, as well as Geostationary Mobile Satellite Service (GMSS) providers. In addition, the Commission surveyed Broadcast Satellite Service (BSS) providers such as DBS and future satellite Digital Audio Radio Service (DARS) operators.

In the satellite industry, some operators are also corporate affiliates of satellite manufacturers. The survey also targeted this relatively small industry segment. By targeting these parent corporations, the Commission hoped that the survey would also provide information about the preparedness of satellite manufacturers.

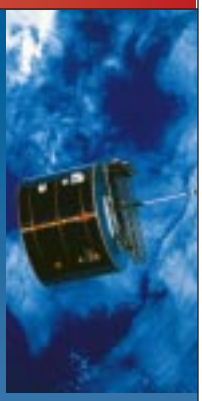
Assessment

The response rate from the satellite industry was mediocre. The Commission contacted 32 operators and received 28 responses, but only 12 of these responses were complete. Of the companies that responded, over 70 percent indicated that they have implemented a formal Y2K plan.

The Commission has since contacted the various companies to try to get both a better response rate and more complete data. The Commission realizes that some companies have expressed reluctance to provide data or are still working to send information as this Report went to press. Since developing a good understanding of the Y2K problem in the satellite industry is difficult without complete data, the Commission continues to seek additional response from all service providers that have not yet returned the questionnaire. However, as of the release of this Report, many of these companies are still hesitant to share individual company information that is essential to fully assess the impact of the Y2K problem. Given the relatively modest response rate, figures in this report might not accurately reflect the satellite industry's overall Y2K readiness.

Industry information suggests that U.S. satellites are at low risk of experiencing adverse disruption or failure due to the Y2K problem. However, given their reliance on earth stations and, in relevant cases, interconnection with the public switched telephone networks, satellite operators still have a responsibility to evaluate and confirm earth station and terrestrial equipment compliance. Some antenna controls and earth stations contain large computers and complex electronics that are date and time-dependent. Responses from earth station manufacturers concerning earth station compliance were inconclusive.

As Figures 1 and 2 indicate, the respondents who have formal processes for dealing with the Y2K problem have completed, on average, almost 100 percent of the inven-



tory stage and nearly 90 percent of the assessment stage for network elements. Respondents expect both stages to be finished by March 1999. With regard to support systems, the inventory and assessment stages are also expected to be finished by March 1999. The inventory and assessment stages of auxiliary systems are near completion. The assessment of all systems project a completion date of July 1999.

Approximately 55 percent of the remediation and testing of network elements has been completed, with 100 percent completion forecasted for September 1999. Operators anticipate a completion date of July 1999 for support systems.

Thirteen percent of the rollout phases have been completed. The rollout of network elements is expected to be completed by October 1999.

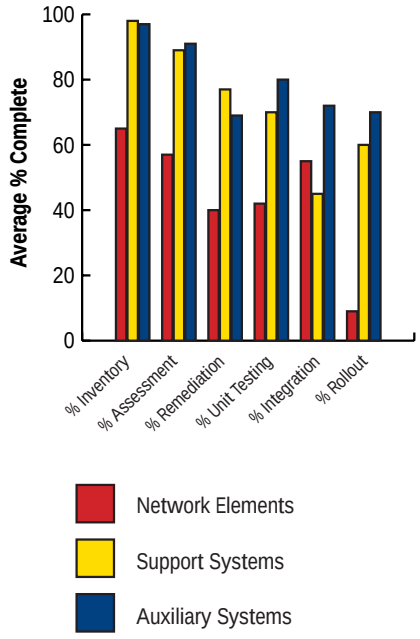


Figure 1.

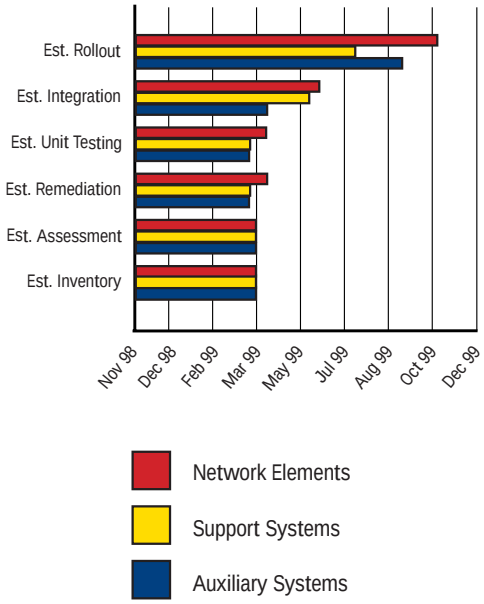


Figure 2.

The integration-testing phase had varied responses. The estimates for integration and system tests in the three areas of network elements, support systems, and auxiliary systems were either consistently good or consistently poor when viewed on a company-by-company basis. The number of companies that fell below 50 percent in each of the categories outnumbered those that estimated above 50 percent completion by almost two-to-one. Answers ranged from “not at all” to 100 percent, and some companies did not expect completion until late in the fourth quarter of 1999.

The questions regarding probability of failure and risk of failure as a result of the Y2K problem and the preparation of contingency plans in light of this event were the two categories with the poorest response rate, even among the limited number of questionnaires returned to the Commission. Approximately 25 percent of the surveys returned had data for these fields. Understandably, but disconcertingly, the companies that had the highest marks in previous fields again had the highest in these two. This is worrisome for the simple reason that with the absence of specific information to the contrary, it appears that the least prepared companies have neither addressed internal Y2K issues nor developed appropriate contingency measures.

Satellite & HF Broadcast

The areas for response in the assessment of probability of failure and risk of failure as a result of the Y2K problem include electric power and suppliers, as Figures 3 and 4 indicate. Of the approximately 25 percent of respondents that conveyed information on these critical areas, the estimates ranged from a mere 20 percent to total completion of assessment and preparation of contingency plans.

Additional Assessment Data and Information

The assessment survey asked several more questions concerning whether each company had adopted a standard definition for Y2K compliance, whether satellite operators were working with any other commercial entities on the Y2K issue, the status of commercial interactions with their vendors and customers, and the availability of resources for their Y2K efforts.

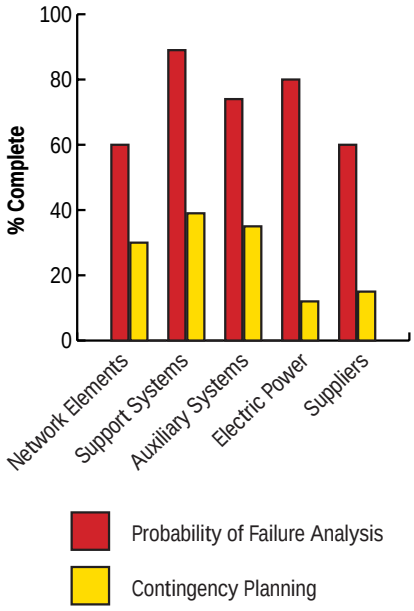


Figure 3.

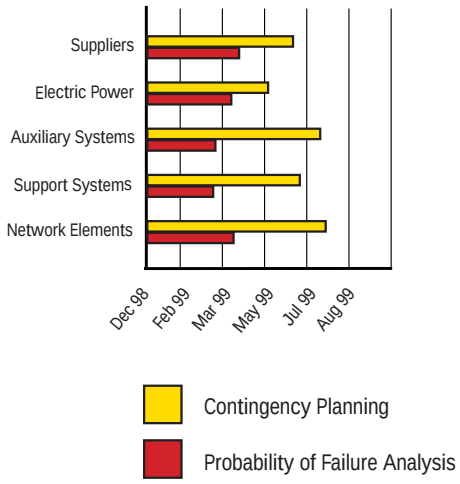


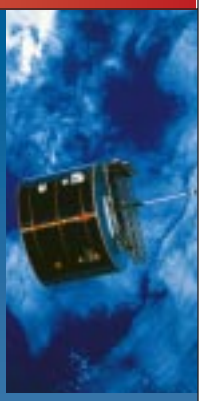
Figure 4.

Survey results show an even split between operators who have and have not adopted an industry-developed definition. Of the 50 percent of operators that selected a standard, most chose the British Standard. The second most selected standard was IEEE 2000.1. Still other operators chose to modify or employ portions of the IEEE 2000.1, GSA, Bellcore, and the British Standard.

In addition, many corporations in the satellite industry that work with other carriers, vendors, foreign carriers, or foreign governments are still uncertain about whether or not the other carriers have adequately addressed the Y2K problem.

Overall, the responses indicate moderate satisfaction with vendor interactions. Respondents indicated they have sent letters requesting compliance status for suppliers' software and equipment items. Most suppliers have responded.

While most of the respondents indicated a shortage of either information or resources, less than 50 percent indicated that they were lacking both. Satellite operators not currently providing service note the negative cash flow environment in which they are operating and that the Y2K problem is diverting already limited resources.



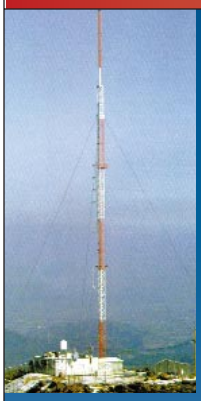
Some respondents indicated that since commercial service for their own system would not begin until after January 1, 2000, that the Y2K problem would be addressed prior to commencing service. The respondent companies not commencing commercial service until after January 1, 2000, on the whole, recognized the severity of the Y2K problem. Some believe they have an advantage over existing systems in the hardware and software procurement process since they are purchasing, constructing, and integrating their systems in an environment of heightened sensitivity to Y2K issues. Still others mentioned the performance of formal testing procedures for Y2K compliance prior to acceptance of any equipment to be delivered to it under procurement contracts.

Conclusions and Remaining Concerns

The general assessment of industry is that in-orbit satellites, or so-called space stations, are generally free of Year 2000 problems because they are relatively devoid of time- and date-dependent processes and systems. However, to the extent that satellites interconnect with earth stations to access various public networks, there is some concern. In that regard, inasmuch as the dates and percentages conveyed, this report may not accurately reflect the totality of the satellite industry's Year 2000 readiness, the FCC must assign some component of risk to the industry due to the mediocre response of the industry to the FCC's survey.

Consumer Tips

- Confirm with your set-top box provider and your Direct Broadcast Satellite receiver manufacturer that all date-sensitive hardware and software in your home is Y2K compliant.
- If you rely on DBS for news and weather information, make sure you have battery-powered radio or TV available so that you can receive over-the-air broadcasts.



International High Frequency (HF) Broadcasts

Summary

- HF broadcasting stations indicate that they should be ready for Y2K.

Introduction

High Frequency (HF) broadcasting, also known as Shortwave Broadcasting, is a radio service licensed by the Commission to operate between 5,950 kHz and 26,100 kHz. This is an international broadcast service where transmissions are intended to be received by the general public in foreign countries.

Methodology

The survey targeted all of the 21 FCC-licensed, international HF broadcasters.

Assessment

The Commission received 15 submissions for a response rate of 72 percent. The 15 submissions represent a cross-section of the Commission's HF licensees, ranging from smaller stations with only one transmitter and one antenna, to stations with more than one transmitter and more than one antenna.

As Figures 5 and 6 illustrate, the respondents who have devised a formal process for managing Y2K remediation efforts have completed, on average, almost 100 percent of the inventory for network elements, support systems and auxiliary systems. Respondents will have completed over 95 percent of the assessment for network elements, support systems and auxiliary systems by the end of the second quarter of 1999.

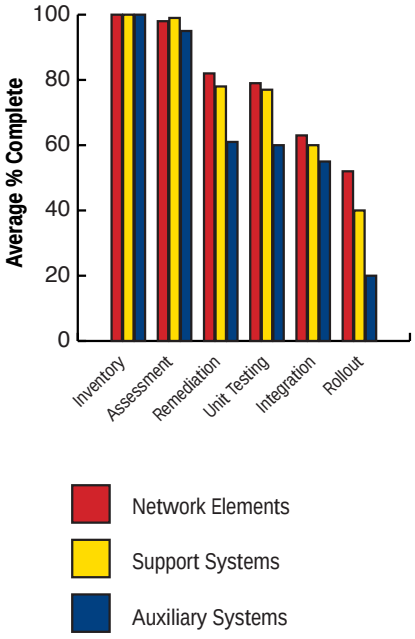


Figure 5.

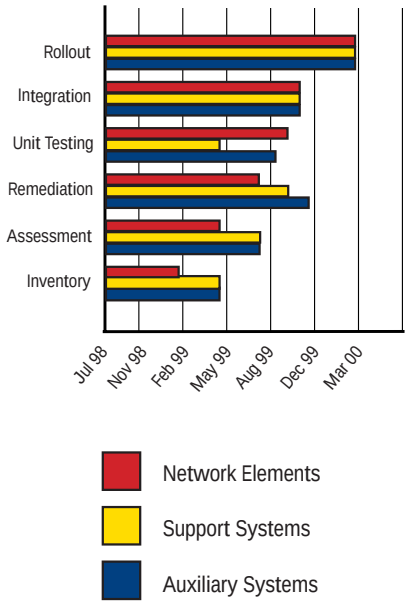
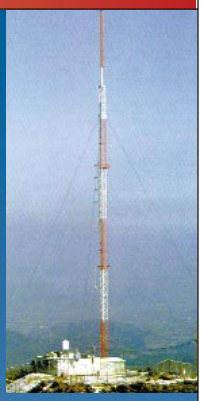


Figure 6.

With regard to network elements, respondents estimate that the remediation phase is 85 percent accomplished with completion by August 1999. The testing phase is 79 percent accomplished with completion by October 1999. The integration phase for network elements is 66 percent complete with total completion by November 1999.



Satellite & HF Broadcasts

Finally, the rollout phase is 53 percent complete with completion in advance of the millennial rollover.

With regard to support systems, as represented by Figure 6, the remediation, testing, and rollout phases are anticipated to be completed by August, May and December 1999, respectively.

As for auxiliary systems, remediation, testing, and rollout phases are moving towards completion. The remediation phase is 62 percent accomplished with completion by December 1999. The testing phase is 61 percent accomplished with completion by September 1999. The integration phase for network elements is 53 percent complete with total completion by November 1999. Finally, based on the respondents' current projection of rollout completion, auxiliary systems are expected to be Y2K compliant by December 1999.

In September 1998, the Commission held a conference call on Y2K issues with 11 of the 21 HF broadcasters. The information gathered during this conference call was consistent with the conclusions of the Commissions' subsequent assessment. While there is the possibility that problems could arise with transmitters, antennas and other related equipment, HF broadcasters represented that their systems should be ready prior to January 1, 2000. However, broadcasters noted they had experienced some difficulty in obtaining information from equipment manufacturers about Y2K compliance.

Figures 7 and 8 illustrate that the respondents who have devised a formal contingency plan, have completed, on average, over 80 percent on network elements, almost 100 percent on support systems and auxiliary systems, and about 50 percent on suppliers. Estimated completion dates are early May 1999, except for suppliers, which are early August 1999.

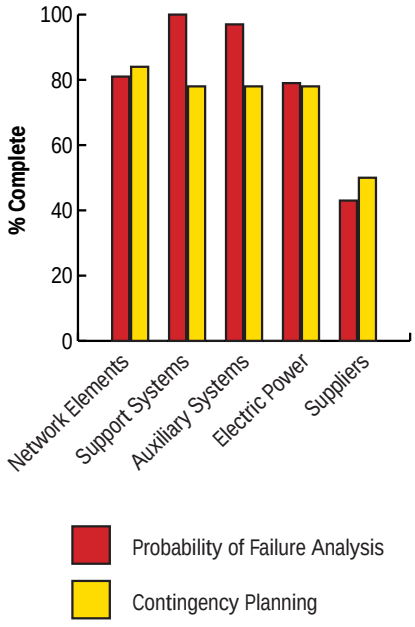


Figure 7.

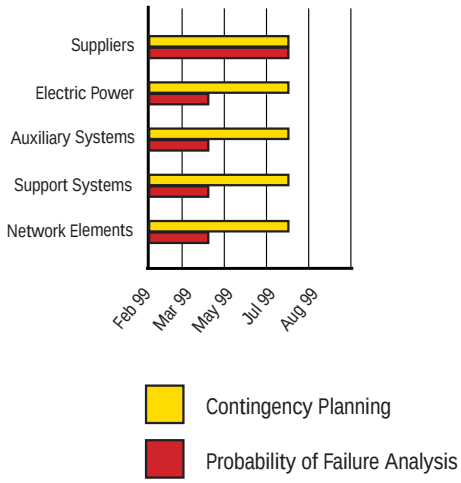
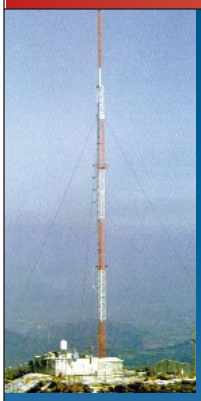


Figure 8.



Additional Assessment Data and Information

The assessment survey queried whether the industry had adopted a standard definition for Year 2000 compliancy, those organizations with whom HF licensees were involved with on Y2K issues, the status of the commercial interactions with their vendors, and the availability of resources during their Y2K remediation efforts. Twenty percent of the licensees indicated that they used one of the industry standards. Twenty percent of the licensees also indicated that they have worked with the National Association of Short Wave Broadcasters. Fifty percent of the licensees rated their vendors "very satisfactory" with only two indicating "moderately satisfactory." There were only three responses concerning whether respondents were lacking resources: one checked "information" but didn't comment on what information was lacking, one entered "no," and one entered "N/A."

Conclusions and Remaining Concerns

The FCC has no information at this juncture to indicate that HF broadcasting stations are not generally prepared for the Year 2000 problems. While there was the possibility that problems could potentially arise with transmitters, antennas, and other related equipment, it was the general consensus of the industry, as evidenced by the survey, that these devices will attain Year 2000 compliancy before the millennial transition.

Consumer Tips

- Although HF stations do not expect to encounter Y2K problems, HF listeners should be aware of possible Y2K-related interruptions of service.
- HF broadcasting station audiences should be aware that from December 31, 1999, to January 1, 2000, stations may switch from line fed programming to taped programming in the event of interruptions in service.

INTERNATIONAL

International Summary

- NRIC reports that most countries categorized as high risk of Y2K network problems are countries with relatively low dependence on telecommunications services.
- According to NRIC, North America, Asia Pacific, and Western Europe are medium to low risk regions.
- North East Asia, Middle East, North Africa, and Eastern Europe are medium to high risk regions.
- Central and South America, the Indian sub-continent, and Sub Sahara Africa are high risk regions.
- The ITU reports that 52 percent of respondents supplying date-specific information to its survey reported their systems anticipated compliance by March 1999.
- Termination of voice and data traffic overseas, which relies on the networks of interconnecting foreign carriers, could be hampered by Y2K problems abroad.

ASSESSMENT OF INTERNATIONAL WIRELINE TELECOMMUNICATIONS CARRIERS

The information we present in this section is the result of analysis conducted and publicly reported by the Network Reliability and Interoperability Council (NRIC) and the International Telecommunication Union (ITU). The ITU, the principle UN intergovernmental organization that coordinates efforts to improve the efficiency and usefulness of telecommunications services, distributed a survey to its entire membership including governments and telecommunications carriers, satellite operators, and mobile providers. While it is one of six sources employed in the NRIC study, we include a separate analysis of the ITU survey as well.

The Commission convened an informational meeting on the Year 2000 Problem and international telecommunications services in June 1998. At that juncture, industry indicated that neither dial tone nor data transmission were likely to experience significant Y2K-related problems.

Some companies reported, however, that billing and maintenance systems were areas of concern. Moreover, the major U.S. international carriers indicated that terminating voice and data traffic overseas, which relies on the networks of interconnecting foreign carriers, could be hampered by Y2K problems abroad.

NRIC SURVEY ASSESSMENT — RESULTS AND ANALYSIS

Methodology

NRIC conducted its own independent assessment of international telecommunications readiness between October 14, 1998 and January 14, 1999. The NRIC assessment, which covered 84 of the 225 countries in the world, examined data collected from six different sources, including the ITU, the Gartner Group consultancy, two major U.S. international telecommunications service providers and two major financial services providers.

International

The assessment study used a methodology in which risk was determined by averaging the data presented by each of the available sources. NRIC scored, totaled, and averaged equally the sources of data for each country. It did not weigh sources differently. The full NRIC study can be found on the NRIC website <www.nric.org>.

We would interject one note of caution in interpreting these results. The international situation is troubling primarily because it has been very difficult to get meaningful and detailed information from many countries. Thus, many countries may be doing much better than we perceive and, conversely, some may be doing worse. Nevertheless, we are of the view that at this stage, poor information availability must be classified as presenting a risk.

Summary

NRIC identified the Y2K readiness of each evaluated country according to perceptions of risk. See Figure 1. NRIC noted that the countries that face a high risk of network problems from the Year 2000 Date Conversion Problem tend to be countries with lower teledensity and thus lower dependence on telecommunications services. The perceptions of risk are ranked "high," "medium," or "low."

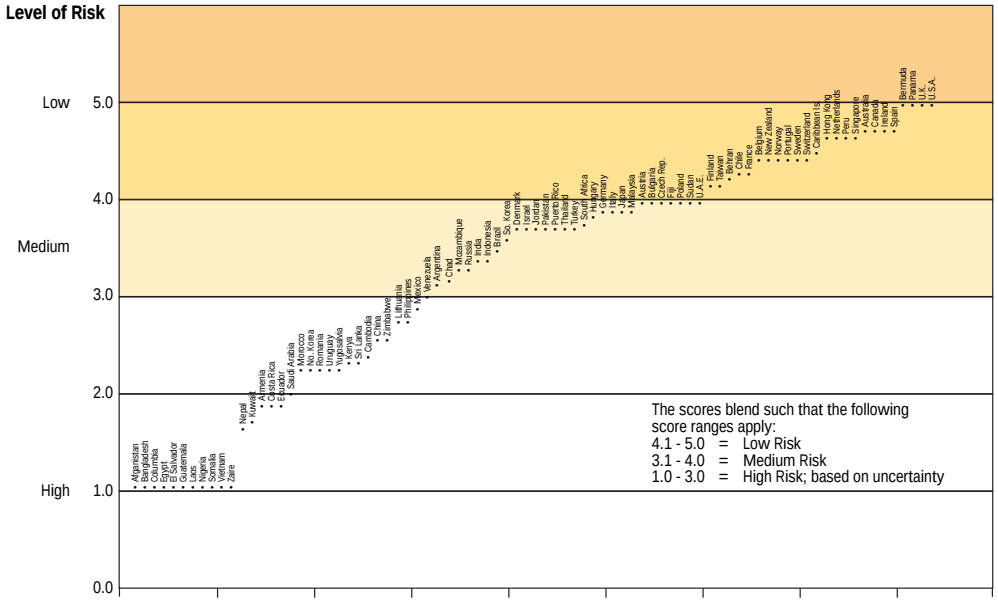


Figure 1. International Status by Country, Perceptions of Risk

Specifically, "high risk" countries predominate in Central and South America, the Indian sub-continent, and sub-Sahara regions (see Figure 2). Of particular concern to NRIC was the fact that 21 percent of telecommunications traffic is originated or terminated between the U.S. and these high risk regions. Approximately, 36 percent of telecommunications traffic is terminated between the U.S. and "medium risk" regions, namely, Northern East Asia, the Middle East, North Africa and Eastern Europe.

Areas classified as "low risk" for Year 2000 problems, by contrast, include North America, Western Europe, and Israel. Approximately 43 percent of telecommunications traffic is terminated between the U.S. and "low risk" countries.

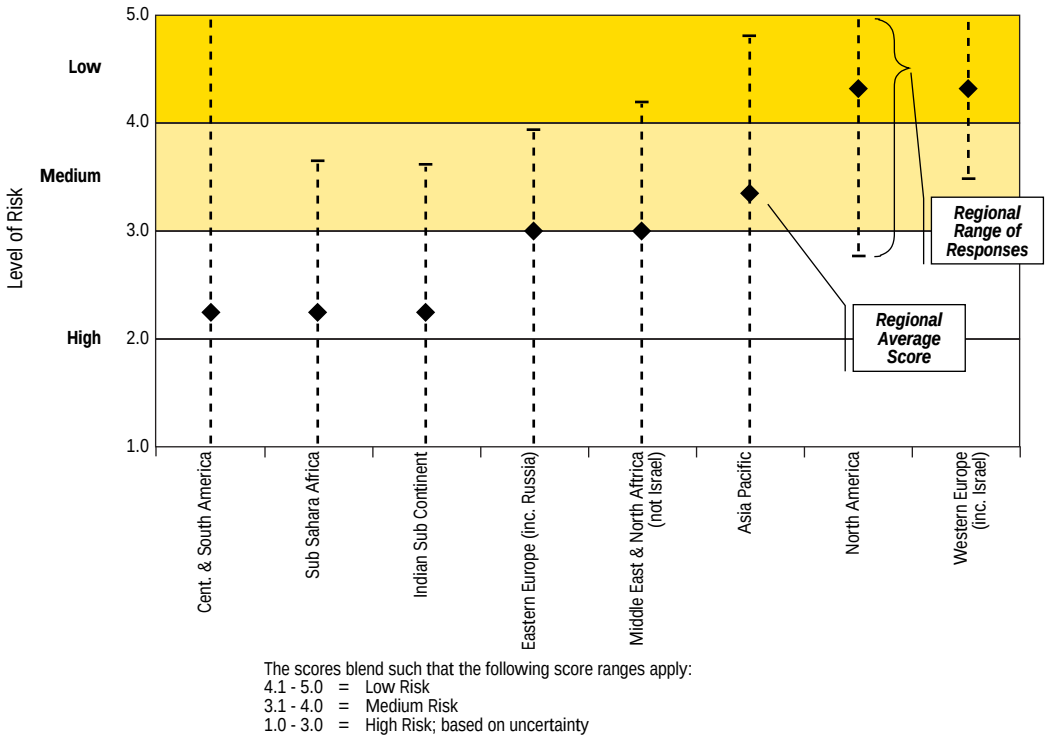


Figure 2. International Status by Region, Perceptions of Risk

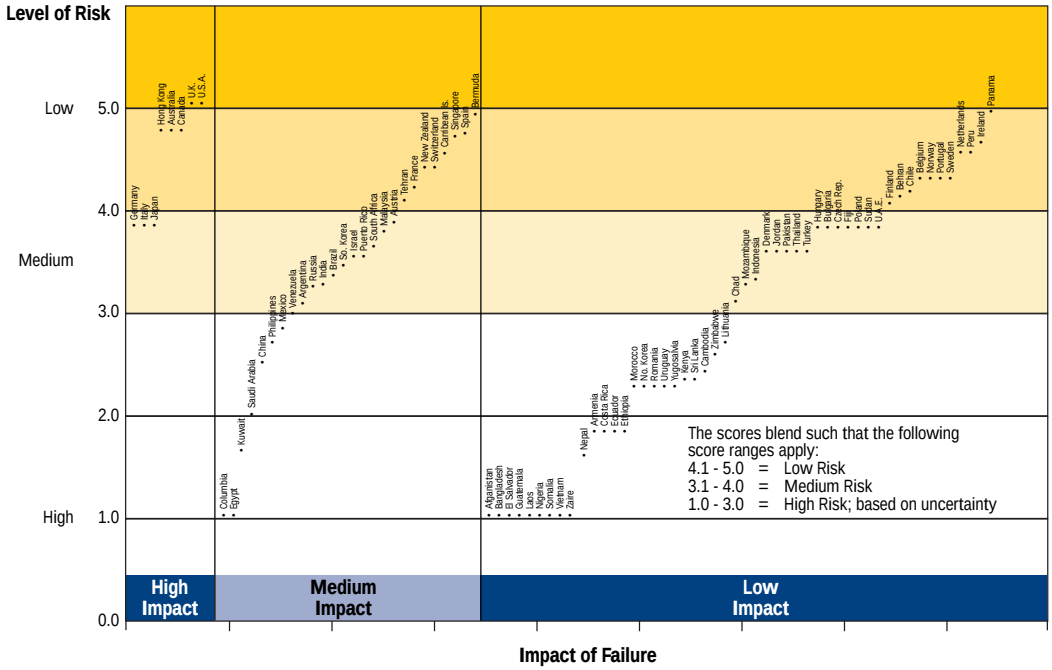
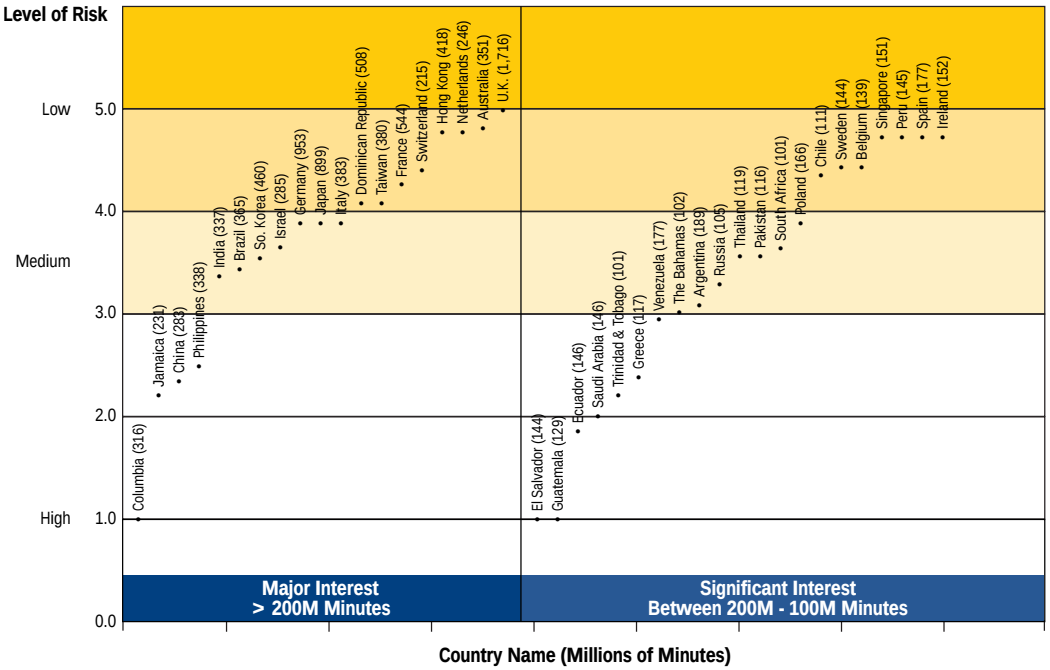


Figure 3. International Status by Country, Perceptions of Risk Impact

In addition, the NRIC assessment attempted to correlate the impact of that on the economic health of each country it examined. The determination of "impact" took into account both a country's teledensity and population. Impact, as indicated in Figure 3, was also assessed as high, medium, and low.



* Minutes of use from 1995 Data (Source: ING Barings–Telecommunications Map of the World, 2nd Edition, September 1997)

Figure 4. Countries of Major and Significant Interest to the U.S. (as Determined by Intercontinental Traffic Patterns, Sorted by Perceived Risk)

Moreover, the NRIC assessment also examined countries according to traffic flows to and from the United States. See Figure 4. Traffic flows were arranged in two groupings: "major interest" and "significant interest." The "major interest" designation denoted those countries having more than 200 million minutes of intercontinental telecommunications (mMitt) traffic to and from the United States. The "significant interest" designation denoted those countries with traffic flows to and from the United States in the range of 100-200 mMitt.

Assessment

NRIC assigned numeric values for the three levels of risk. Based on a 0-to-5 scale, NRIC rated scores between 0.0-to-3.0 as high risk; 3.1 to 4.0 as medium risk; and 4.1 to 5.0 as low risk.

The valuations are more precisely labeled according to the following score ranges:

- < 3.0 = High Risk; based on uncertainty
- 3.0 - 3.2 = Medium-High Risk
- 3.3 - 3.8 = Medium Risk
- 3.9 - 4.1 = Medium-Low Risk
- 4.2 - 4.7 = Low Risk
- 5.0 - 4.8 = Very Low Risk

NRIC reported that a country identified as "high risk," was labeled by NRIC as such because there was no information available about that country's telecommunications network or, alternatively, because of a self-admission of failure.

Low and Medium Risk Countries Include:	Medium and Medium High Countries Include:	High Risk Countries Include:
United States (5.0)	Russia (<3.5)	Yugoslavia (<2.5)
Australia (<5.0)	Mexico (<3.0)	Uruguay (<2.5)
Canada (<5.0)		Romania (<2.5)
United Kingdom (5.0)		Colombia (1.0)
France (<4.25)		Bangladesh (1.0)
Germany (<4.0)		Afghanistan (1.0)
Italy (<4.0)		
Japan (<4.0)		

The above list of contries is not exhaustive, but rather representational.

A country identified as "medium risk" was perceived to have a telecommunications network that would be Y2K ready in December 1999, though in advance of the millennial rollover. There was less confidence overall that the network will be able to provide the same level of reliable and continuous service on January 1, 2000, as before.

Finally, a country identified as "low risk" was perceived, based on data and information collected from the six independent sources discussed immediately above, to have a telecommunications network that would be Y2K-ready by June 1999. Accordingly, the evidence conveyed a relatively high level of confidence that the country's telecommunications network will be operational on January 1, 2000. However, NRIC indicated that most of its information is based on anecdotal evidence and perceptions of risk.

ITU Survey Assessment — Results and Analysis

Methodology

The ITU distributed a separate survey, entitled "The ITU Year 2000 Millennium Compliance Questionnaire," to its members, which include both national governments and telecommunications, satellite and mobile operators, on May 26, 1998. Unlike the NRIC study, the ITU survey involves self-certification by its members rather than an ITU evaluation.

The questionnaire asked respondents to provide: 1) dates by which they expect their operations to be Y2K-compliant; and 2) dates by which they plan to test Y2K compliance. The ITU will continue to update the survey as responses are received, and will continue to redouble its efforts by circulating subsequent questionnaires on an ongoing basis in order to get a better response rate from governments and operators. (The Commission has sent letters to all U.S. international telecommunications and satellite operators that are members of the ITU urging them to complete the ITU Year 2000 questionnaire.)

As of March 1, 1999, more than 300 governments and operators had submitted responses. Approximately, 13 U.S. international wireline carriers have responded. Table 1 summarizes these results.

GROUPING	Responses Providing an Anticipated Date for Compliance or Testing	Respondents Anticipated Y2K Compliance by 3/1/99	Respondents Anticipating Y2K Compliance after 3/1/99	Countries Represented in Responses	Countries Failing to Provide Dates for Compliance or Testing	Respondents Failing to Provide Dates for Compliance	Respondents Failing to Provide Dates as % of all Responses from Region
Africa	27	9	17	24	8	12	30
Americas	91	55	35	29	0	4	4
Asia & Australia	67	37	29	31	8	13	16
E. Europe & N. Asia	9	5	4	6	0	0	0
W. Europe	85	39	42	26	1	15	16
Mobile	16	8	7	n/a	n/a	1	6
Satellite	9	5	4	n/a	n/a	1	10
TOTAL	**304**	**158**	**138**	**116**	**18**	**46**	**13**

Table 1. Responses to ITU Survey. A response from either a governmental agency or an operator based in that country suffices to provide data for a given country.

Discussion

It is important to note that a large percentage of fixed access lines in the world are concentrated in only a few countries. Specifically, the United States, Japan, China, Germany, France, and the United Kingdom account for 53 percent of the aggregate total. The ITU's regional breakdowns on Table 1 may not be readily self evident because it groups countries as geographically diverse as New Zealand and Saudi Arabia into a single region, "Asia & Australia," while lacking a specific category for the Middle East.

The ITU questionnaire shows that the countries with the most difficulties addressing their Y2K problems are predominantly developing countries from the African continent, South Asia, and Southeast Asia, though there are notable exceptions such as Colombia, Romania, and Guatemala. Eastern Europe, the Middle East, and Central and South American countries ranked themselves as relatively more prepared for the Y2K problem, while Western Europe, the United States, the Caribbean, and Pacific Rim countries have appear to have made the most progress preparing for the millennial transition. The ITU information can be found at the ITU website (www.itu.int/y2k/).

In comparing the NRIC and ITU assessments, both identify developing countries as lagging in reaching Y2K compliance, while countries dominant in fixed wireline access and international telecommunications traffic exchange are characterized as better prepared for Y2K.

There are few disparities between the two studies. Unlike the NRIC study, the ITU survey involves self-validation by its individual members rather than evaluation by the ITU. In the ITU assessment, countries are categorized according to their own assessment of readiness whereas in the NRIC report countries are ranked according to risk by NRIC, itself. Because the ITU survey participants provided the information voluntarily, its accuracy may vary considerably from country to country. On the other hand, as an intergovernmental organization, the ITU, has extensive breadth and credibility to reach telecommunications operators around the world and is likely to be consistent and representative in its data collection efforts of its members.

Other International Activities

The Commission recognizes the direct involvement and leadership of the ITU in connection with global efforts to mitigate the effects of Y2K problem. The ITU Year 2000 Task Force is headed by British Telecom representative, Ron Balls, and has heightened international awareness and provided direction on the global Y2K problem. A primary objective of the task force is to help develop outreach and advocacy strategies and methods for assessing and monitoring readiness for the ITU, as well as the foreign governments and foreign correspondents which comprise its membership.

The ITU, through its Year 2000 Inter-Carrier Testing Sub-group, is conducting testing, and has developed additional plans for regional testing worldwide. One test in early September 1998 among Germany, Sweden, and Hong Kong, uncovered only a few Year 2000-related problems. However, each of these systems had undergone extensive remediation and testing. The ITU has facilitated the sharing of information and best practices for inter-carrier testing upon the conclusion of each regional test. The organization has also facilitated operator-to-operator testing, and published various test scenarios, plans and test results.

The organization has agreed to a process model and set time schedules for agreement of the overall strategy and documentation of testing guidelines, best practice and report specifications. The number of operators involved in this group has increased considerably. The group has progressed to a global focus with involvement from Asia, Africa, the Middle East and North America. The main operators involved are AT&T, Bell Atlantic, British Telecom, Cable & Wireless, Deutsche Telekom, Etilsata, GTE, Inmarsat, Intelsat, Korea Telecom, MCI/WorldCom, Sonera, Sprint, Swisscom, Telekom South Africa, Telenor, Telstra, and Unisource.

Moreover, the ITU has conducted several workshops to assist specific countries on their Year 2000 problems. From April-December 1998, seven workshops were held in various regions around the globe with telecommunications operators. The ITU plans to hold workshops in Moscow, India, and Asia in 1999.

In support of the ITU Year 2000 Task Force, the Commission participates in various ITU meetings where the topics of information exchange, international interoperability testing and contingency planning are discussed. Moreover, at the ITU Plenipotentiary Conference in Minneapolis, Minnesota, in November 1998, the Commission participated in efforts that resulted in the adoption of a resolution for increased Y2K awareness and better government-industry coordination.

Conclusions and Remaining Concerns

Although the United States and many other countries are well along in their efforts to meet the Y2K challenge, the Commission is particularly concerned that some international telecommunications carriers, especially those in developing countries, are ill equipped to address the seriousness of the problem and have not yet taken the necessary steps to prevent system failures. The Commission's concern stems from lingering questions about whether some international telecommunications carriers have the resources-including capital, technical and personnel expertise-to adequately address the Y2K problem. The Commission is also concerned that the current international economic slowdown in various parts of the world may limit the ability of foreign carriers to address the Y2K problem. In addition, we note that some European carriers have previously expressed difficulty in having to re-condition advanced electronic systems for both the Euro conversion and Y2K problems.

Various international users that are dependent on telecommunications networks have also indicated to the Commission that they are especially concerned about the need for greater disclosure by foreign carriers on how they are addressing the Y2K problem so that users can then determine how to design their contingency plans in foreign countries. In addition, users have serious concerns about certain countries that impose regulatory restraints that prevent them from accessing alternative networks to route traffic should a non-Y2K ready foreign correspondent's network fail to operate, and thus jeopardize a user's business. The full involvement of the United States' foreign partners can facilitate removal of regulatory restrictions that limit users of telecommunications networks from obtaining access to alternative networks and services to avoid Y2K disruptions.

Consumer Tips

- For any important international phone calls you plan to make on January 1, 2000, you may want to make the call in advance of that date, just to be prudent.
- If you face busy signals when placing an international phone call on January 1, 2000 it may merely be the result of unusually high traffic anticipated over that holiday period. Wait several minutes before re-attempting the call.

Emergency Services

EMERGENCY SERVICES

Summary

- Emergency services are critical to life and safety and reviewing these systems for Year 2000 problems must be of the highest priority.
- Emergency communications are made up of a collection of different services including 911 calls, dispatch services, wireless communications to response teams, and the Emergency Alert System. These systems are owned by different entities and made up of different equipment. This increases the difficulty and the need for cooperation.
- Of critical concern is the Public Safety Answering Point where many networks come together and many different systems are employed. This creates a challenge for local governments and entities charged with readying these services.
- Manufacturers indicate that they have been engaged in Y2K outreach programs, and groups such as the Telco Year 2000 Forum have been testing emergency equipment.

INTRODUCTION

The Commission has been working with communications providers, broadcasters, equipment vendors, public safety professionals, and other government officials to identify critical elements within the emergency communications system, and to encourage appropriate action. The public safety communications network consists of four distinct elements, although not all elements are necessarily involved in every emergency situation. These elements are:

- The transmission of the alert, typically through a 911 telephone call;
- The processing of the call, usually at a Public Safety Answering Point (PSAP) or other public safety operator or communications center;
- Dispatching the "first responder," usually by a wireless radio system; and,
- If necessary, alerting the general public through the Emergency Alert System (EAS). EAS is generally invoked in situations involving serious local, state, or national emergencies, which may be broadcast by radio, television, or cable channels.

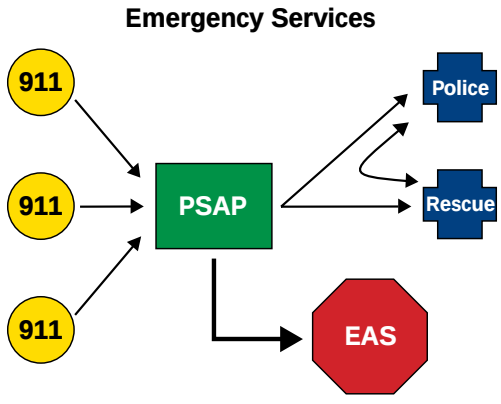


Figure 1. Emergency Services

Each of these elements must function properly in order for the system to react effectively to an emergency. These components, however, typically are managed or controlled by different entities and are regulated by various levels of government. Thus, a cooperative effort is important when it comes to preparing emergency services for the Year 2000. At the local level, these government entities include city, county, and other organizations responsible for public safety. At the national level, these entities include, but are not limited to, the Federal Emergency Management Agency (FEMA), the Department of Justice (DOJ), the Department of Defense (DOD), and the Commission. To assist these governmental entities and other interested parties in understanding the potential Year 2000 vulnerability of their emergency communications systems, considerable testing of these systems and their components has been done. For example, the Telco Year 2000 Forum has been testing 911 emergency numbers; information regarding that testing was released on March 3, 1999.

Emergency Services

Maintaining accurate and effective emergency communications during the Year 2000 date rollover is a high priority. The challenge, however, lies in the fact that emergency communications require several distinct systems to interoperate seamlessly to ensure timely response by emergency personnel. Robert Miller, Technical Issues Director of the National Emergency Number Association (NENA), testifying at the Commission's Year 2000: Maintaining Emergency Response Communications Forum said "virtually every link in the emergency chain involves complex interrelated processes and everywhere there are time-date stamps." Any scenario involving a malfunction in emergency services creates a significant risk of harm.

911 Telephone Calls and Public Safety Answering Points

There are approximately 300,000 emergency calls per day in the United States. The 911/E911 Emergency Reporting System is the portion of the emergency communications system that enables a caller to dial a common three-digit number for all emergency services. Today, over 90 percent of the population is covered by some form of 911.

Enhanced 911 (E911) is an advanced form of the basic 911 service. With E911, the telephone number of the caller as well as other stored information about the location of the caller is transmitted to the PSAP where it is cross-referenced with an address database to automatically determine the caller's location. The emergency dispatcher can then use this information to direct public safety personnel responding to the emergency.

The first step in an emergency communication involves the call from the person reporting the emergency to the appropriate dispatch center. As explained elsewhere in this report, Year 2000 problems with switching or transmission equipment could interfere with the routing of the call to the appropriate dispatch center, or PSAP.

The second step is the actual processing of the emergency call, usually at the PSAP. There are approximately 4,300 PSAPs in the country. Communities without PSAPs rely on public safety agency operators and communications centers to process these calls. At the PSAP, the operator verifies or obtains the caller's location, determines the nature of the emergency, and decides which emergency response teams should be notified. In most cases, the caller is then conferenced or transferred to a secondary PSAP from which help will be dispatched. Secondary PSAPs might be located at fire dispatch offices, municipal police headquarters, or ambulance dispatch centers. Often, a single primary PSAP will answer for an entire region. The PSAP is especially vulnerable to Year 2000 problems because they generally rely on sophisticated computer technology and they interconnect with many private networks with different types of equipment.

There has been significant activity in response to the importance of 911 calls and PSAPs. The Commission hosted a forum in November 1998 involving representatives from wireline carriers, manufacturers, local officials, and federal emergency management officials, to coordinate the efforts of the various groups involved in monitoring aspects of emergency communications. Representatives from large telephone companies described their efforts to contact PSAPs within their operating territories.

Emergency Services

Focus Group 2 of NRIC 2 has made PSAPs one of its key study areas within the broader category of customer premises equipment devices (CPE), primarily because of the key role PSAPs play in the proper dispatch of emergency services personnel. At the January 1999 meeting, NRIC reported some initial findings regarding PSAPs. See Bill Blatt, Presentation of Focus Group 2 (January 14, 1999) <www.nric.org/meetings/>. Calls to PSAPs are delivered through the public network, and NRIC noted that the Year 2000 upgrades to network elements such as central office switches and 911 tandems fall under the Year 2000 remediation programs of wireline carriers. NRIC further reported that although initial research on address data providers (typically, a function outsourced by wireline telephone companies) showed good Year 2000 programs, but that more information was needed.

The Telco Forum has also been engaged in 911 testing with three major PSAP equipment manufacturers; no failures have been reported. Manufacturers of dispatch equipment have also demonstrated cooperative information sharing by posting readiness information on their respective websites.

Finally, the U.S. Fire Administration of FEMA is working with other organizations to survey the progress of PSAPs in the country, and that some states have undertaken similar surveys. The U.S. Fire Administration survey is currently underway with results forthcoming.

Wireless

The third element of the public safety communications network involves dispatching emergency response teams. Once the call is routed to the appropriate PSAP operator or agency dispatch center, a trained dispatch officer typically uses a wireless land mobile radio system to dispatch mobile units to the scene. During the emergency, these radio systems can be used by emergency units and officers at the scene to coordinate activities amongst themselves, with those units still on their way, and with dispatchers and command bases. These systems can also be used to communicate with additional response resources such as hospitals, morgues, hazmat units, highway agencies and public utilities. Often, however, radio interoperability among different agencies using different radio systems is unavailable, or achieved only through complicated cross-system patches coordinated by the dispatcher or through the use of electronic switches or gateways.

Public safety communications entities are indicating an increased awareness of the urgency of Y2K preparedness for emergency services. At the two Y2K public safety forums held at the Commission in June and November last year, public safety agencies and associations reported that all states and many larger county and city public safety agencies were well on their way to full Y2K readiness. The Commission also heard, however, that many smaller, isolated or more rural agencies may have difficulty understanding or dealing with the problem, and that these agencies may require assistance in addressing Y2K.

Manufacturers report that analog and digital radio systems operating in conventional mode (non-trunked mode not involving computer switching) are not date-sensitive and therefore are not typically at direct risk for Y2K failure. These systems are the kind operated by the vast majority of state and local public safety agencies, including nearly all smaller and rural agencies. For radio systems using computerized trunking, encryption, gateway and other advanced features that are at higher risk for Y2K failure, manufacturers report that they are engaged in active user notification and remediation assistance programs. Many federal agencies, states or

Emergency Services

larger public safety entities that own large, advanced, and expensive systems have dedicated substantial resources to testing, remediation and contingency planning programs in their agencies. The major manufacturers controlling 90 to 95 percent of the public safety equipment market have reported that all new equipment now being sold is Y2K ready, and upgrades or remediation packages for all legacy equipment is now or will shortly be available.

Certain advanced dispatch services such as computer-assisted dispatch (CAD) may be at greater risk for Y2K failure, and replacing these complicated and expensive systems can take more than one year. This means that CAD systems identified now as non-compliant might not be able to be replaced before the year 2000. Failure of one of these systems, however, should not prevent manual, non-computer assisted, emergency dispatch activities until the problem can be solved or a replacement CAD unit can be obtained.

Of course, all public safety wireless licensees, large or small, must also address the possibility of other kinds of Y2K-related computer or embedded chip failures that do not directly involve their radio systems, but the failure of which could affect their ability to communicate or otherwise deliver emergency services. These include possible failures of electronic security systems or electronic features in vehicles. Public safety contingency planning must address the reactions to possible failures of these and other systems, both internal and external to the agencies.

In a recent rulemaking proceeding involving public safety radio spectrum, the Commission sought comment from the public on the best ways of ascertaining both the extent of Y2K readiness in the public safety communications community and the progress and range of compliance initiatives undertaken by that community. The Commission expects to issue an Order early in 1999 to address this issue in light of the numerous comments and replies received in response to this inquiry.

Emergency Alert System

The Emergency Alert System (EAS) is the fourth element to emergency communications. EAS is a national emergency communications system designed to give governments the ability to rapidly communicate with the entire population in times of national emergency. This system has the potential to provide emergency information in conjunction with the news reports, special reports, and other services that broadcast companies normally provide. The EAS system has never been used on a national basis, although it has frequently been used on a state and local level in times of severe weather or other localized emergency.

All broadcast stations and cable systems must participate in EAS; other communications providers may participate voluntarily. A September 15, 1995 White House Statement of Requirements signed by the President required that the Commission and FEMA develop, implement, operate, sustain and have ready the national level EAS. This system replaced the Emergency Broadcast System.

EAS is structured so that national, state and local messages can be injected into the system to alert the public. Industry volunteers work to develop EAS plans that use industry facilities in a coordinated, efficient, and timely manner to alert the public. The National Weather Service digital signaling technique on NOAA Weather Radio and the EAS digital signaling technique are identical. All EAS equipment is based on handling the Julian date of the year.

Emergency Services

The EAS system only recently replaced the Emergency Broadcast System, and new equipment capable of receiving and decoding the EAS header codes and emergency messages was required to be installed at broadcast stations by January 1, 1997. Accordingly, virtually all EAS equipment is new and, according to statements by EAS hardware and software manufacturers, both equipment and software is either compliant or, if not compliant, is being updated and provided to customers. Participants at the Commission's November 16, 1998, Emergency Preparedness Forum confirmed these facts and the overall readiness of the EAS system. Nevertheless, participants recommended that stations take steps to ensure they are staffed the night and morning of December 31, 1999/January 1, 2000.

Cable

Practically all cable vendors of EAS equipment have disclosed that EAS equipment is Y2K compliant. However, since implementation of EAS equipment for all cable systems will not be completed until October 1, 2002 (when cable systems serving less than 10,000 subscribers are required to complete installation and begin operation), the effects of Y2K on the entire EAS network once the various components come on line is still unclear. Cable systems serving greater than 10,000 subscribers must have had EAS equipment installed and operational by December 31, 1998, which provides operators an opportunity to assess the system while operational prior to the year 2000.

Accordingly, the information obtained from the Y2K questionnaire indicates that 45 percent of the cable respondents have examined the effects Y2K may have on the delivery of EAS messages (see Figure 2). This group consisted primarily of large and medium-sized operators. As Figure 3 shows, 76 percent of the respondents, including operators who had not yet installed EAS equipment, did not anticipate any problems with the implementation of EAS. Some small operators indicated that they were unable to know at the current time and reserved judgment until after installation. In situations where EAS or other local emergency notification systems were not already in place, approximately 40 percent of cable operators determined the systems to be Y2K ready (see Figure 4). Finally, approximately 50 percent of cable operators have been able to obtain verification from vendors that their EAS equipment will be Y2K ready (see Figure 5). The remaining respondents have not yet contacted EAS vendors or are awaiting a vendor response.

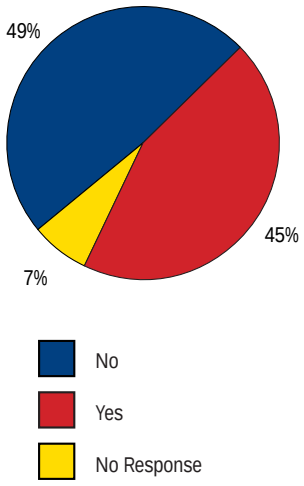


Figure 2. EAS Examined

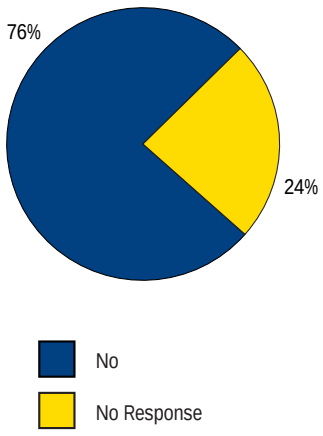


Figure 3. EAS Problems

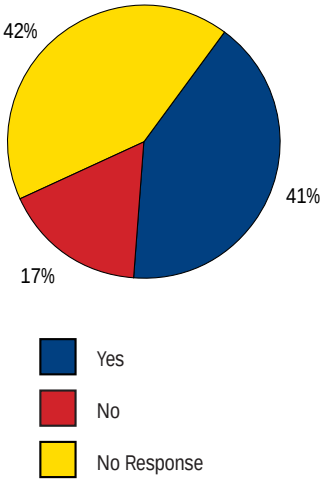


Figure 4. EAS Ready

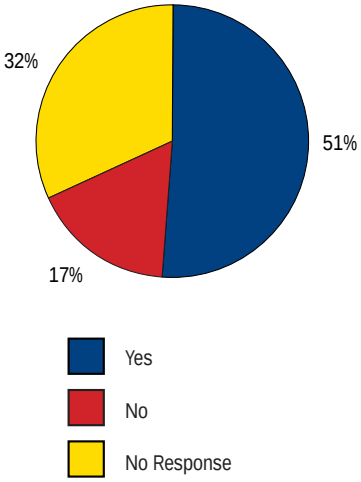


Figure 5. EAS Vendors Certified

Figure 6 and Figure 7 represent the status of EAS and the estimated completion dates. As the figures show, the majority of the respondents are well along in the inventory, assessment, and remediation phases. However, the testing and rollout phases are less than 50 percent complete, with an average completion date of October 1999. The respondents have, on average, completed more than three-quarters of the assessment of the probability of the failure of the EAS and half of the contingency planning. The risk assessment is expected to be completed by July 1999 and contingency plans developed by August 1999 (see Figures 8 and 9).

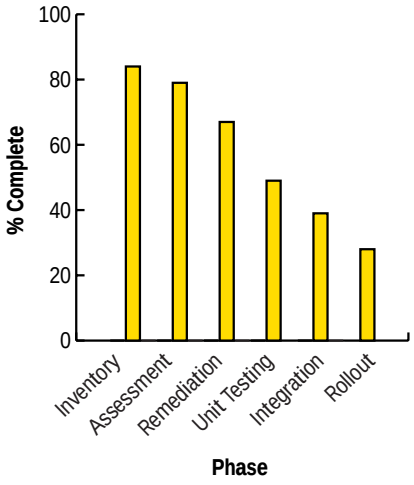


Figure 6. Average Percent Complete — Emergency Alert System (EAS)

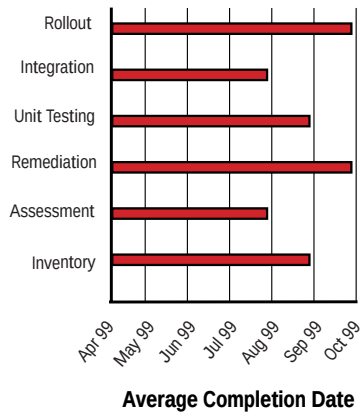


Figure 7. Average Estimated Completion Dates — Emergency Alert System (EAS)

Emergency Services

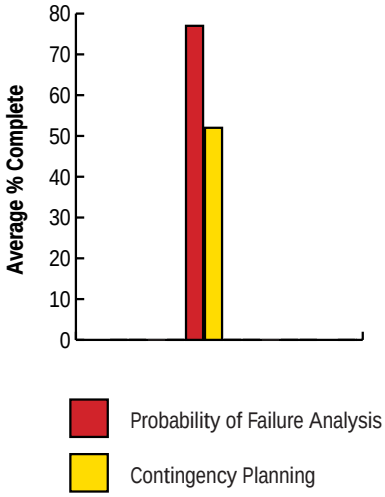


Figure 8. Contingency Planning — Emergency Alert System (EAS)

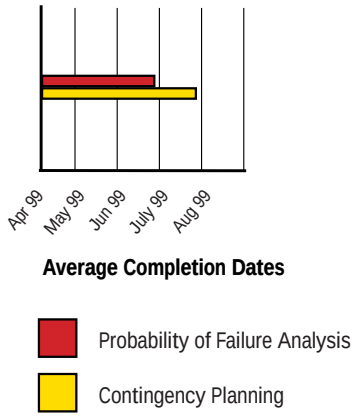


Figure 9. Contingency Planning — Emergency Alert System (EAS)

Broadcast

EAS readiness was also a part of the Commission's assessment of mass media in which it contacted a 230-member cross-section of large, medium, and small licensees. The data indicate that responding licensees are 92 percent complete, on the average, with their inventory of EAS equipment. See Figure 10. Furthermore, they averaged 86 percent completion with their assessment phase, 73 percent with regard to the remediation phase, 67 percent with respect to unit testing, 56 percent complete with integration and system testing, and 48 percent complete with the rollout phase. They, on the average, expect to be completed with these phases anywhere from March 1999 (inventory and assessment phases) to May 1999 (rollout phase). Responding licensees were, on average, 79 percent complete, with their EAS probability of failure assessment and 68 percent complete, in making contingency plans. See Figure 12. The average expected completion dates for these phases are March and April 1999, respectively. See Figure 13.

As was the case with other aspects of broadcast station Y2K readiness, small and large licensees were relatively close with regard to assessment of their EAS systems but medium-sized licensees were lagging behind. For example, while small licensees are, on average, 93 percent complete with the assessment phase regarding their EAS equipment, and large licensees are 90 percent complete, medium-sized licensees are, on average, 80 percent complete. With respect to unit testing, small licensees are, on average, 84 percent complete and large licensees are 70 percent complete, medium-sized licensees are only 54 percent complete. As to system integration and testing, small licensees are 78 percent complete, large licensees are 56 percent complete, but medium-sized licensees are but 39 percent complete and do not expect to complete this phase until, on average, two months after small and large-sized licensees. Responding licensees of all sizes, however, are at relatively the same place with regard to probability of failure analysis and contingency planning with respect to the EAS system.

Emergency Services

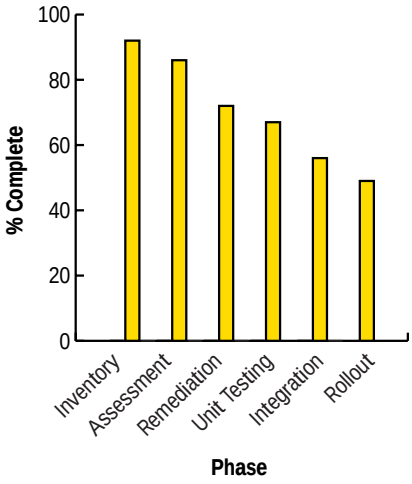


Figure 10. Average % Complete — Emergency Alert System (EAS)

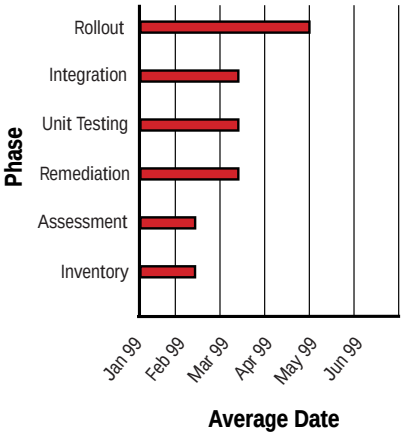


Figure 11. Average Estimated Completion Dates — Emergency Alert System (EAS)

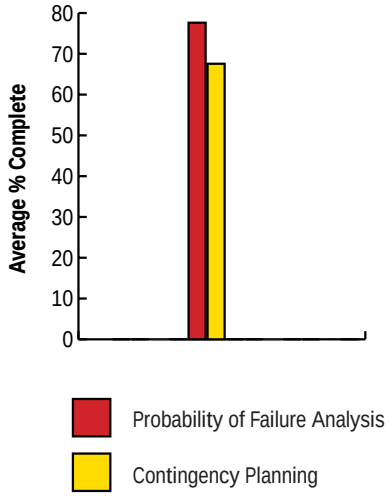


Figure 12. Contingency Planning — Emergency Alert System (EAS)

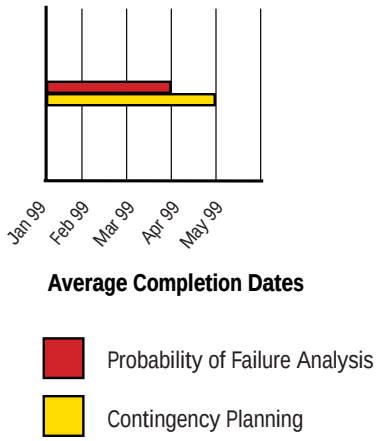


Figure 13. Contingency Planning — Emergency Alert System (EAS)

Emergency Services

Consumer Tips

- Be sure to have a phone available that does not rely on electric power. While regular phone service can operate when there is no power, cordless phones may not.
- Consider fully charging wireless phones and having extra batteries available.
- Consider having a battery-operated radio or TV available in order to receive emergency information and broadcasts.
- Be sure to note the phone number of emergency services; not all services use the same emergency services phone number and “911” has not been implemented in all areas, paricularly with wireless services.
- If you own a CB or marine radio with battery power, check to ensure that the batteries are charged. If circumstances require communications via CB services, be sure to stay clear of emergency channels in order to let emergency communications pass.

Global Positioning System

The Global Positioning Satellite system (GPS) is a satellite-based global navigation system originally developed by the U.S. Department of Defense to enhance the effectiveness of U.S. military forces. Over the years, GPS also has been used in civilian applications requiring precise location information (e.g., mapping, surveying, and navigation). The GPS consists of 24 satellites, with the orbits of these satellites designed so that multiple satellites are passing over any given spot on the earth's surface at any given time. Each satellite transmits a time-coded signal. A GPS receiver then uses data from multiple satellites to rapidly calculate the location, altitude, and velocity of a vehicle or aircraft carrying the receiver. The system uses a timekeeping system that works on a 1024-week cycle, which ends in 1999.

The Department of Defense, which operates the GPS system, has reported that the GPS signal and military GPS receivers are Year 2000 compliant. However, there may be software problems in some civil GPS receivers that may cause Year 2000 Problems. These civil users will need to verify that their receivers and applications will work properly through the Year 2000-related problems.

Some GPS receivers may also be affected by the End-of-Week (EOW) problem. The length of the cycle, know as an "epoch", was set at 1024 weeks so it could be transmitted in a 10-bit block. This means the GPS system time rolls over every 20 years, with the current cycle to change at midnight on August 21, 1999, 132 days before the Year 2000. This EOW rollover problem may misinterpret the August 22, 1999 as January 6, 1980, August 23, 1999 as January 7, 1980 and so on. This is how the precise rollover date is computed:

The time-scale origin (time zero) of GPS System Time, 00:00:00 UTC 6 January 1980, is Julian Day 2,444,244.500. A GPS Cycle is 1,024 weeks, or 7,168 days, so the first GPS rollover will occur at Julian Day (2444244.5+7168)= 2,451,412.5, which is 00:00:00 UTC 22 August 1999 AD, which is the midnight between Saturday night the 21st of August, and Sunday morning the 22nd of August, 1999.

Many receivers will be unaffected by the change, but some may suffer a variety of problems, from temporary shutdown to minor problems in service. It also is possible that some receivers will have positional errors in addition to incorrect dates.

The United States Coast Guard maintains a website <www.navcen.uscg.mil/gps/geninfo/y2k/> that contains a list of civil GPS manufacturers who may be consulted to determine whether their equipment would be affected by the end of the GPS 1024 week calendar, as well as the Year 2000.

Tower Lighting

Tower Lighting

Year 2000-related problems may affect antenna structure owners' ability to properly light their towers, or may affect systems designed to notify owners when lights fail or malfunction. The Commission — in conjunction with the Federal Aviation Administration (FAA) — regulates those antenna structures that may affect air navigation by requiring that many tall structures be painted and lighted. Under the Commission's rules, when a top steady burning light or any flashing light goes out or malfunctions and the problem is not corrected in 30 minutes, the owner must report the outage to the nearest FAA Flight Service Station. The FAA then issues a Notice to Airmen (NOTAM) to warn pilots flying in the vicinity of the dark tower. The owner must correct the problem as soon as possible. Although properly lighted antenna structures provide the best measure of protection to aircraft, the 30-minute notification rule is a well-established means of notifying pilots of light problems for the time between outage and repair.

The Commission has addressed the antenna structure lighting issue though issuance of a Public Notice outlining tower owners' responsibilities in light of Y2K, and by holding a forum in December 1998 on the topic that brought together government, the tower construction and lighting industry, Commission licensees, and tower owners. At the forum, light equipment manufacturers indicated that their systems do not incorporate date-based processing or contain other components that are at risk for Year 2000 failure. Several manufactures have Y2K statements about their products in their sales literature or on their websites. However, some risks may be present at a secondary level. The lighting manufacturers generally could not extend their Y2K claims to components added to their light systems. Typically, such add-ons include monitoring and light-failure record and notification equipment, and alternate power sources. Y2K-related failures of these components would potentially affect an owner's ability to power the lights and to become aware of a light outage. In addition, for those structures without backup sources of power, a representative of the electric power industry asserted that, while widespread power failures are unlikely, smaller "nuisance" outages may still occur. The general consensus of those Forum panelists representing owners was that they appear to be prepared for tower light problems. The Personal Communications Industry Association (PCIA) stated that it has surveyed its members to make sure they have adequately addressed the possibilities of towers not being lit or automatic monitoring systems not being capable of reporting lighting failures. PCIA members indicated that they have determined the likelihood of such failures due to Y2K-related problems is negligible. A broadcast-engineering consultant stated that broadcasters, and others who routinely maintain emergency generators and backup batteries at tower sites, should be able to maintain lighting even if there are commercial power disruptions.

Because the consequences of an aircraft striking an unlighted tower can be fatal, tower lighting is a critical safety issue. Prompt and proper FAA notification is vital for any light outage or malfunction caused by Y2K-related problems. The nearest FAA Flight Service Station will be listed in the phonebook; an owner unable to locate this information should either contact the FAA Regional Office (these are listed on the Application for Antenna Structure Registration form — FCC Form 854) or the nearest airport for assistance.

CONCLUSION

Year 2000, though a relatively simple problem in its origin, is very complex to eradicate. This complexity stems, in large part, from our ever-increasing dependency on technology in the course of our daily business and personal lives. This dependency has made it challenging to root out and exterminate this bug.

We are encouraged by the progress being made by the larger companies to prepare for year 2000, and are cautiously optimistic about the ability of these companies to withstand even unforeseen problems with minimum disruptions to the services they provide. It is important to remember that in many industries, these large companies serve the vast majority of consumers. For example, over 92 percent of the people who receive phone service fall into this category. And while the large telephone companies cannot guarantee that customers will have no Y2K related problems, we generally concur with their assessment that for most of their customers phone service disruptions will not occur, or be minor and remedied quickly.

We remain concerned about smaller companies, however. Many of these companies have adopted a systematic approach to addressing Year 2000 with completion deadlines dangerously close to millennium rollover, leaving little time for delays from vendors or remediation as a result of problems discovered in the testing process. And whether in telephone, cable, broadcast or wireless, many small companies have not adopted systematic approaches to addressing Y2K, a course that we believe is necessary to adequately address the problem. Companies that do not follow a systematic process similar to the one outlined in this report risk missing not-so-obvious elements that could negatively impact their services if a Y2K problem were to occur.

It is also extremely important that companies continue to work together to share information and solutions. As we have seen from the work of NRIC, the Telco Forum, ATIS, and CableLabs, to name a few, pooling resources and sharing solutions are vital to addressing Year 2000. Information sharing will only become more vital as the new year approaches and time to correct problems runs short. Therefore, we continue to encourage companies to work together and to take advantage of the work that has already been done in identifying Y2K problems, testing, and contingency planning.

Thus, we will continue to monitor the progress of the industry and we will redouble our efforts with respect to the small companies. This will include maximizing our response rate where it is low, and updating the information in this report accordingly. We will also continue to work with our industry partners to reach out to these smaller companies, to advocate the adoption of a systematic approach and to offer resources for information sharing and solution building.

In closing, our collective task is daunting. But it is not unlike other apparently insumountable challenges that have confronted the telecommunications industry specifically and the country generally. We are committed to meeting this challenge and we will continue driving toward that end.

SURVEY

SAMPLE WIRELINE SURVEY

Cover Letter

Dear :

As we are sure you know, many computers, computer chips, and software programs used throughout the world were not designed to take into account the date change that will occur in just less than 400 days, when we enter the Year 2000. Even at this late date, experts are uncertain what the likely total effect of this so-called "Millennium Bug" will be. One thing, however, is certain. All sectors of the global economy, including provision of emergency and utility services, food distribution and banking and financial services, to name some, depend upon reliable communications networks. Failure to avert network failures could be calamitous. It is therefore critical that the communications industry take comprehensive and effective action to address the Year 2000 problem.

Clearly, government agencies can not solve the Year 2000 problem. This is a job that each member of the communications community must undertake. Communications companies, equipment manufacturers, and software producers are essential participants in this effort. Nevertheless, serious national interests requiring government attention are at stake. The Federal Communications Commission ("FCC") has been monitoring efforts undertaken by communications companies to address the Year 2000 problem, but we need your help to remain fully informed of the status of your efforts to address these issues. We are today asking the chief executives of the many companies in all segments of the communications industry to respond to the information request attached to this letter.

The assessment incorporates both a questionnaire and a metric that attempts to quantify your efforts to address the Year 2000 problem (a sheet explaining definitions used in both the metric and the questionnaire is attached for your convenience). Please respond to this mandatory information request within 30 days of the date of this letter. Please file a separate response for each of the following businesses under your control: wireline common carrier, wireless common carrier, cable, satellite, and broadcast. The Commission may choose to share with the Network Reliability and Interoperability Council some or all of the information you submit, for the purpose of developing an aggregate assessment of industry preparedness. If you do not wish to have this information shared, please so indicate in your response.

Your information should be filed in the Office of the Secretary and addressed to Marsha J. MacBride, Task Force for Year 2000 Conversion, 1919 M Street, NW, Washington, D.C. 20554. Or, you may instead file the information electronically at the Commission's Year 2000 Web site www.fcc.gov/year2000/. If you have any questions, please call Doug Cooper, at (202) 418-1686, or e-mail at dcooper@fcc.gov.

We realize that you have every incentive to ensure that our communications systems continue to operate without disruption in the Year 2000 and beyond. If, however, you are looking for additional resources for addressing Year 2000, please visit our website at www.fcc.gov/year2000/.

Thank you for your attention to this most important matter.

Sincerely,

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PAPERWORK REDUCTION ACT

The public reporting for this collection of information is estimated to average 40 hours for providers, 20 hours for manufacturers per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the required data, and completing and reviewing the collection of information. If you have any comments on this burden estimate, or how we can improve the collection, please write to the Federal Communications Commission, AMD-PERM, Paperwork Reduction Project (3060-0866), Washington, DC 20554. We will also accept your comments via the Internet if you send them to jboley@fcc.gov. Please do not send completed data to this address.

Remember — you are not required to respond to a collection of information sponsored by the Federal government, and the government may not conduct or sponsor this collection, unless it displays a currently valid OMB control number or if we fail to provide you with this notice. This collection has been assigned an OMB control number of 3060-0866).

THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, P.L. 104-13, OCTOBER 1, 1995, 44 U.S.C. Section 3507.

DEFINITIONS

We partition communications systems into three major subsets as follows:

Network elements — those systems, components, or software that directly affect telecommunications transmission and/or reception (e.g., computer switches, routers, and amplifiers).

Support systems — operations support and administrative maintenance systems (such as maintenance, billing, parts ordering, etc.).

Auxiliary systems — systems or components such as payroll, human resources, security and alarm control systems, environmental control systems, etc.

A frequently cited analytical process for assessing and remedying the Year 2000 problem includes five basic phases. These phases are defined as:

Inventory Phase — This step consists of performing a complete survey of computer, electronic, and telecommunications systems, from the largest mainframe computers to communications computers, routers, and switches; to embedded processors in control systems such as heating, ventilation, and cooling (HVAC) systems; to facsimile (FAX) machines; and to all other telecom equipment.

Assessment Phase — This step attempts to determine whether or not the systems or components identified in the inventory phase will be able to process information in a consistent manner before and after the rollover to Year 2000. Assessment may be as simple as contacting the system's vendor, or as complex as evaluating custom programs.

Remediation Phase — This step involves upgrading, changing, or retiring, the hardware or software in the systems or components identified in the assessment phase, as appropriate.

Unit Testing Phase — Once systems or components are remediated, they must be tested to determine whether all Year 2000 problems have been solved. Typically, individual systems or components are evaluated with a varying range of dates, using formal testing methodologies. Each system or component should operate properly before and after the introduction of test dates (e.g., December 31, 1999, January 1, 2000, February 29, 2000).

Integration and System Testing Phase — Systems or components must be tested together in their operating environments.

Rollout — Some large companies operate large networks of subsystems. These companies may first remediate and test a system in isolation or in a lab. Having finalized a plan, this remediation will then be rolled out to the company's entire system.

These phases are fluid. Having completed one phase, a company may go back and repeat earlier phases. For instance, every action taken should, to the extent possible, be followed by testing. Testing may reveal unforseen circumstances that may require a return to assessment and remediation.

Contingency Planning Definitions

In addition to reviewing the major subsets listed on the previous page, contingency planning should examine electric power and suppliers. Following the planning model above, inventory and assessment should be extended to electric power and suppliers. Two additional phases are defined as:

Probability of failure and risk assessment phase — For major subsets of each system, analyze the probability of failure due to Year 2000 date change problems (and for each supplier). For each subset that may fail, what is the risk to business operations of that failure.

Contingency plan phase — For those systems with high probability of failure and high risk to business operations, you will need to develop contingency plans.

FCC Information Request

The FCC seeks information regarding your organization's preparations for making the transition through the Year 2000 date change. We have designed this questionnaire to be succinct, and we appreciate your quick response. Please feel free to attach any standards, briefing charts, or background material you may have. Please respond by January 15, 1999.

Your response can be filed by completing this form and mailing to the FCC or electronically at http://www.fcc.gov/year2000/assessment.html.

Company Information

1) What is the size of your company (please check only one - fill out a separate hard copy or electronic response for each of the below where the service is a part of your company)?

[ ] Local telephone carriers - How many access lines do you service? ....._____
[ ] Long distance carriers - How many customers do you serve? ....._____
[ ] Wireless carriers - How many customers do you serve? ....._____
[ ] Satellite providers - How many domestic and international uplinks are you responsible for? ....._____
[ ] International Wireline - How many minutes of traffic do you deliver? ....._____
[ ] International HF Broadcasting - How many frequency hours are you authorized to operate during the current winter season? ....._____

2) What states do you service? If you provide a national service, or international service, please so indicate.

_____

_____

_____

_____

_____

3) What is your total Information Technology (IT) budget and your total IT budget devoted to Y2K?

	Total IT Budget	Total IT Budget devoted to Y2K
1997		
1998		
1999		
2000		

Organization

4) Who is in charge of your organization's Year 2000 remediation efforts? If appropriate, include responses for your international lines of business specifically. To whom does this person report (please include title)? Please describe how your effort is organized. How many people are involved?

Y2K Effort Leader: _____

Title: _____

Phone: _____ E-mail: _____

Reports to: _____

Title: _____

Number of people involved in Y2K effort: _____

5) Has your organization adopted an industry developed definition for Year 2000 compliance? Yes ____ No ____ If so, please indicate which standard. If appropriate, identify both domestic and international standards.

[ ] British Standard
[ ] Bellcore
[ ] IEEE 2000.1
[ ] GSA (FAR)
[ ] Other specify:_____

6) Have you implemented a formal process for managing your Y2K remediation efforts? If so, please fill out the metric found in Attachment 1. Only those companies whose remediation plans include a rollout phase should fill out the rollout section of the metric.

[ ] Yes, see Attachment 1.
[ ] No

External Relations

7) Do you maintain an up-to-date website to disperse information regarding your Year 2000 remediation efforts? If so, please provide the web address for this site.

[ ] Yes URL: http://_____
[ ] No

8) Are there other carriers, vendors, foreign carriers, and foreign governments with whom you are involved that are not adequately addressing the Year 2000 problem? If appropriate, please identify them and describe the nature of your concerns. Please use additional space if necessary.

8b) If so, how will this impact your operations?

9) Are you working with local, regional, or national organizations, and/or international/intergovernmental organizations to share information about or conduct testing regarding the Year 2000 problem, including those organizations that are concerned with public safety? If appropriate, please indicate the name of the group and a contact person or a website address.

10a) Please characterize the level of cooperation you have experienced, on average, with your vendors (supply chain) and customers.

[ ] Very satisfactory
[ ] Moderately satisfactory
[ ] Unsatisfactory

If unsatisfactory, please explain steps that you have taken to compensate.

10b) Have you begun to work with your supply chain (your suppliers) on Year 2000 problems? If so, what is the status of your interactions? If not, when will you begin this effort?

11) Are you lacking specific information or resources that are slowing you toward addressing the Year 2000 problem? Please check only those that apply.

[ ] Information
[ ] Personnel resources
[ ] Monetary resources

If you checked a box, please explain the nature of the resource problem.

12) Have you begun or do you plan to conduct joint testing with your customers and vendors? If so, what is your time frame for such testing?

Contingency Planning

13a) Have you begun contingency planning, in the event that some of your systems have problems from the Year 2000 transition? If so, please fill out Attachment 2 and please indicate contact information for the person responsible for this effort. If not, when do you plan to begin?

[ ] Yes, see Attachment 2
[ ] No

13b) If so, please describe, in general terms, the approach you have taken to mitigate domestic and foreign risks.

Supplemental

14) Are there any unique problems or circumstances that you have encountered? If so, please describe and indicate whether or not we can make this information available to others.

15) If you have any standard briefing materials, papers or presentations on your Year 2000 efforts, please feel free to attach them.

Thank you for your attention to this matter.

Respondent's name: _____

Title: _____

Company: _____

Address: _____

Telephone: _____

FAX: _____

E-mail: _____

YEAR 2000 CONTINGENCY PLAN

	Assessment of probability of failure and risk		Preparation of contingency plan	
	% Complete	Est. Comp. Date	% Complete	Est. Comp. Date
Network Elements				
Support Systems				
Auxiliary Systems				
Electric Power				
Suppliers				

	Inventory		Assessment		Remediation		Unit Test	
	% Complete	Est. Comp. Date (1)	% Complete	Est. Comp. Date	% Complete	Est. Comp. Date	% Complete	Est. Comp. Date
Network Elements								
Support Systems								
Auxiliary Systems								

(1) Estimated Completion Date

	Integratrion and Systems Test		Rollout	
	% Complete	Est. Comp. Date	% Complete	Est. Comp. Date
Network Elements				
Support Systems				
Auxiliary Systems				

ATTACHMENTS

PARTIAL LIST OF PROBLEM DATES

It is estimated that there are over twenty date values that could result in malfunctions and for which networks should test. The list below includes some of the more notorious date values.

Potential Event Horizon (Failure) Date	*Comments*
Jan 1, 1999	Two digit year values may be represented as "99," a value that may signify something other than the year 1999. For instance, in some databases "99" or "9999" was used to signify end of data set or to indicate that there was no value available for that date field.
Aug 21/22, 1999 (midnight)	Global positioning systems: GPS system time, which counts weeks, started counting on midnight 5/6 January 1980. On midnight, August 21/22, 1999, the GPS week will rollover from week 1023 to week 0000. This could be interpreted as an invalid date in some receivers.
Sep 9, 1999	Potential date value of "9999." As with Jan 1, 1999, this date value has the potential to signify something other than the year 1999. Also, April 10, 1999, is the 99th day of 1999.
Dec 31, 1999	Potential date value of "99." In some systems this date was used to signify "never expires."
Jan 1, 2000	First occurrence of a day in the year "00." This day may be confused with Jan 1, 1900, resulting in improper analysis of the date values. It is important to note that while Jan 1, 1900 was a weekday, Jan 1, 2000 is a weekend. January 3 is the first working day of the year 2000.
Feb 29, 2000	The year 2000 is a leap year; the year 1900 was not.
Year 2038	The date value in UNIX and Linux, two popular network operating systems, in a 32 bit system, reaches its largest positive value, resulting in the risk of malfunction.

Useful Y2K Communications Websites

General

Federal Communications Commission www.fcc.gov/year2000/

National Association of Regulatory Utility Commissioners www.naruc.org/Y2K/y2klinks.htm

President's Council on Year 2000 conversion www.y2k.gov

Small Business Administration.....www.sba.gov/y2k/

United States Coast Guard on GPS www.navcen.uscg.mil/gps/geninfo/y2k/

Telecommunications

Alliance for Telecommunications Industry Solutions.....www.atis.org

Cellular Telecommunications Industry Association.....www.wow-com.com/techops/y2k/y2k_index.cfm

General Services Administration's Y2K Telecommunications Web Site y2k.fts.gsa.gov

International Telecommunication Union www.itu.int/y2k/

National Telephone Cooperative Association.....www.ntca.org/bus_tech/y2k/index.html

Network Reliability and Interoperability Council.....www.nric.org

Oregon Telecommunications Association.....www.ccwebster.net/ota-y2k/

Organization for the Promotion and Advancement of Small Telecommunications Companies sdsweb.sds.rhtelco.com/y2k/

Personal Communications Industry Association.....www.pcia.com/advocacy/index1.htm

Rural Utility Service www.usda.gov/rus/y2k/index.htm

Telco Year 2000 Forum.....telcoyear2000.org

Telecommunications Industry Association www.tiaonline.org/y2k/

United States Telephone Association www.usta.org/y2kwebpg.html

Emergency Services

Association of Public Safety Communications Officials.....www.apcointl.org/Y2K/

Federal Emergency Management Agency www.fema.gov/y2k/

Society of Broadcast Engineers .....www.sbe.org/eas/eas_2000.html

Cable & Mass Media

Cablelabs .....www.cablelabs.com/PR/Y2K_rel.html

National Association of Broadcasters www.nab.org/Year2000/

National Cable Television Association www.ncta.com/y2k.html

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Analysis of Responses by Small Carriers Without Formal Remediation Plans

Question 11 – This question required carriers to inventory the resources that they have available to address Year 2000 issues. The results are shown in the table below. The high response for "information" indicates that medium/small carriers generally believe that they lack adequate information on how to address Year 2000 issues. Responses to this question are consistent with our prior finding that the medium/small-sized carriers lag behind the large carriers in their remediation activities. The high response rate for "information" also is indicative of the complexity of addressing all of the problems that will be presented. While the responses by carriers with and without plans to this question were similar, their added comments on the question provided additional insight on the differences between the two groups. Carriers with plans generally were concerned over missing some details of remediation. Carriers without plans, on the other hand, seemed to be less sure about what information they needed. This leads us to conclude that carriers without plans may be significantly further behind in their remediation efforts than carriers with plans.

Question 11	*With Plans*	*Without Plans*
Are you lacking specific information or resources that are slowing you toward addressing the Year 2000 problem? (Information, personnel resources, monetary resources) Please explain the nature of the resource problem.	1. Information 2. People 3. Money	1. Information 2. People 3. Money

Question 5 – This question asked carriers to identify the Year 2000 definition that they have adopted, if any. A Year 2000 definition is important to identify where a carrier needs to remediate. We believe that a carrier reporting that it has adopted a Year 2000 definition indicates that the carrier has conducted the necessary research into the alternative definitions and their implications. As can be seen from the response rates shown in the below table, a significantly larger number of the carriers with formal planning processes had adopted a Year 2000 definition than those that did not have a formal planning process. Among those responding in the affirmative, the most commonly reported standard is Bellcore's, followed by switch manufacturer standards.

Question 5	*WithPlans*	*Without Plans*
Has your organization adopted an industry-developed definition for Year 2000 compliance? If so, indicate which standard.	Yes - 46 percent	Yes - 17 percent

Question 10 – This question probed the relationship between carriers, vendors, and customers. The second part asked if they had begun working with their vendors. In evaluating the carriers' responses we note that nearly all carriers, irrespective of whether or not they reported plans, indicated that their relationship with vendors and customers was "very satisfactory" or "moderately satisfactory." This indicates that medium/small carriers generally maintain good relations with their suppliers and customers. We find this outcome encouraging because vendors are a primary source of information and guidance on remediation. Furthermore, a cooperative relationship with customers suggests that these carriers are sensitive to their customers' needs and presumably would not fail to take the actions necessary to reduce the risk of service disruptions.

Question 10a	*With Plans*	*Without Plans*
Characterize the level of cooperation with your vendors and customers.		
Very Satisfactory	53 percent	60 percent
Moderately Satisfactory	46 percent	40 percent
Unsatisfactory	1 percent	

Question 10b	*With Plans*	*Without Plans*
Are you working with your suppliers?	Yes – 92 percent	Yes – 76 percent

The response to the second part of Question 10 — whether carriers are working with their suppliers — measures a carrier's depth of involvement with its vendors in resolving its Year 2000 problems. Note that a much larger proportion of carriers with formal planning processes indicated that they were working with suppliers than did those without a formal process or contingency plan. We believe that the difference in response rates for the two groups is material and indicative of a difference between carriers with and without formal plans. When taken together, the responses to the two parts of the question lead us to conclude that a good carrier/vendor relationship may be insufficient; a carrier must proactively work with its vendors to solve its Year 2000 problems. Again, information is critical and carriers that actively work with their vendors will have more information than those that are not working closely with their vendors.

We believe that the responses to the questions discussed above indicate that the medium/small carriers without formal planning processes may be behind the carriers with formal planning processes in their Year 2000 preparation. Without more specific information, it is very difficult to determine whether these carriers will be ready on January 1, 2000 or what additional aid or information they require. We are encouraged that our December survey has caused several of these carriers to examine their Year 2000 efforts and to formalize their planning activities.

NCTA Letter

November 16, 1998

Ms. Marsha MacBride
Executive Director
FCC Y2K Task Force

Dear Ms. MacBride:

Thank you again for the opportunity to meet with you on October 29, 1998 to discuss "Year 2000" issues. The following is a brief summary of those discussions.

Background

NCTA and Cable Television Laboratories, Inc. (CableLabs) have been building Year 2000 (Y2K) awareness within the cable industry since late 1997.

- CableLabs created a Year 2000 (Y2K) Working Group in November of 1997 to share information and best practices regarding Y2K issues. The principle objective of the information exchanged is the focus on uninterrupted service delivery and customer care.
- In May of this year, NCTA provided to its member companies information on how they can be proactive and prepare for the next millennium. Because NCTA represents cable operators, cable programmers and cable industry equipment suppliers, we can be most effective in helping our member companies transition smoothly through the Year 2000 by actively facilitating, as well as participating, in Year 2000 awareness building activities throughout the cable industry.
- NCTA distributed a letter to its Associate members (cable industry vendors and manufacturers) requesting that they make available on their websites information about their companies products and services with respect to Year 2000.
- CableLabs hosted a Year 2000 Vendor Symposium. This conference was open to all cable operators, regardless of their membership status in CableLabs. The symposium is an important part of CableLabs' overall Y2K effort on behalf of the industry. Selected cable industry vendors, including representatives from addressable set-top box manufacturers, billing systems and headend components, spent two days presenting their plans for becoming Year 2000 compliant. In addition to the formal presentations, the vendors discussed their testing and certification plans.
- NCTA's Office of Small System Operators distributed a memorandum to independent/small system operators providing resources on Year 2000 readiness. Information in this memorandum included useful websites and related material; CableLabs' initiatives, and upcoming industry sessions devoted to discussing Year 2000 issues.

NCTA and CableLabs are working together to jointly address Year 2000 issues, and we want to assure you that we will continue our collaboration to help make sure that this "millennium transition" occurs smoothly without service interruptions.

EAS and Related Equipment

We feel that it is especially critical to address concerns raised regarding Emergency Alert Systems (EAS) and broadcast television services, as well as cable-modem and telephony services being deployed by the cable industry.

As you know, the Commission's rules regarding EAS compliance by the cable industry stipulate that cable systems serving 10,000 subscribers or more must have EAS equipment installed and operational by December 31, 1998. Remaining cable systems must have equipment installed and operational by October 1, 2002. Based

on our understanding, all EAS equipment currently available to cable system operators to meet these schedules is Year 2000 compliant.

The cable industry currently delivers analog broadcast television services. So far as we are aware, no cable systems scramble or otherwise process these channels using equipment that would raise Y2K considerations. We remain highly confident that the distribution of these channels would not be adversely effected.

We also recognize that a growing number of consumers utilize cable television for high-speed data connections and telephone service. Fortunately, the equipment that we employ to provide these services is relatively new, and we have been assured by the relevant manufacturers that both the residential and headend equipment devices are free from Y2K implications.

However, what is less clear to us is the status of customer-owned consumer electronics devices, such as VCRs and personal computers. In addition, customer-owned consumer electronics such as VCRs and personal computers may have Y2K problems that in effect, cause service interruptions in individual consumer homes. While these potential problems are out of our control, our industry will work proactively to educate our customers as information becomes available.

Cable System Equipment

We have created sub-categories of equipment to assist in the evaluation of potential exposure. The following paragraphs summarize potential problems by equipment location and function.

Source Feeds/Reception Devices

These are devices used to introduce source content to the headend. In general, cable television signals originate from one of three sources: broadcast, satellite and local origination. We have previously noted broadcast origination. Some cable systems use automated equipment to switch among sources to feed a single cable channel. We sometimes call this equipment non-duplication switchers, although they also serve other purposes. Many of these switches are old and are not Y2K compliant and, therefore, will need to be replaced. Suitable functional equivalents are commonly available from manufacturers at a modest capital investment.

The second source of cable television signals is satellites. We have been informed by the satellite program providers that the satellites themselves, along with their ground-based control facilities, will not experience Y2K software problems. However, the video playback equipment which sends these services to the satellite are, in most cases, highly automated. Some of these automation systems are outdated, and the software that controls them will need to be fixed. Once again, we are confident that these programmers have identified the problems and have directed timely fixes for these systems. The programmers have been participants in the CableLabs Y2K program and are keenly aware of the need to provide uninterrupted uplinking of their respective services.

The final source for cable programming falls into what we define as local origination. This category includes cable-originated programming (e.g., city council meetings), access programming mandated by franchise authorities, and commercial insertions into satellite programs.

Local origination and access pose a low risk of Y2K problems. Few of these systems are automated, either in production or playback and, thus, do not rely on calendar

dates. Commercial insertion systems, on the other hand, are highly automated and fairly pervasive. Many of these systems are not Y2K compliant, and this is further complicated by the fact that many of the original vendors are no longer in business. This is another example of systems that will have to be reviewed before the millennium. As with other headend switching equipment, though, functional equivalents are available today at a reasonable cost.

Signal Processors

Most television sources that do not originate within the cable system itself pass through some sort of signal processing equipment. For broadcast services, this equipment is usually used simply to change frequencies or manage signal levels. The equipment used to accomplish these tasks is, without exception, not dependent on the date or time. In some instances, these process signals are passed through some form of switching device, as mentioned above. These devices are largely dependent on the time and date, and many of these are old and susceptible to Y2K problems. Although some of the newer equipment can be upgraded to be Y2K compliant, much cannot, either because it is not cost effective or the original manufacturer is no longer in business. These will need to be replaced. Functional equivalents are available at a modest cost.

A similar situation exists for basic services received by satellite. Time and date are not issues, even for the newest digital receivers. As with broadcast services, it is not unusual for these channels to pass through switching devices. In fact, the switches themselves are the same in both cases, and therefore, the need for upgrade or replacement is the same.

However, if the satellite service is one that we call a premium service, such as HBO or Showtime, the signal also passes through a scrambling device before modulation onto the cable system. Although there are some existing non-addressable scrambling systems in use today (none of these have Y2K problems), most are addressable and are covered below.

Commercial Insertion/Switching Devices

In addition to the switching and routing devices explained above, many satellite services have local commercials inserted at the local level. The number of channels with which such insertion equipment is used varies from system to system; some cable operators do not insert commercials at all, while many insert commercials into from four to eight of the most-viewed channels. A few cable systems insert commercials into 16 or more services simultaneously.

Insertion equipment is problematical for the cable industry. Much of it is older analog equipment, and many of the original manufacturers of this equipment are no longer in business or otherwise no longer directly support the systems. The majority of these systems will need substantial upgrades or outright replacement with Y2K-compliant equipment.

Addressable Set-Top Controllers

Desktop and rack mounted computers send program and pay-per-view authorization commands to set-top converters in customers homes. An early part of the cable industry's Y2K assessment process revealed that many of our addressable boxes are aware of the time and date; however, they do not have internal clocks. Instead, they are told of the time and date from a device called an addressable controller, normally located at the cable headend or business office.

We have been assured by the manufacturers that no set-top box will need to be replaced or updated due toY2K.

The first addressable controllers consisted of mini-computers (HP-1000, IBM Series 1, DEC PDP-11, etc) running proprietary operating systems and custom software.These devices often relied on special hardware extensions to manage the addressable boxes. Modern systems now run on standard high-end PCs under Unix or Windows NT and have application software written in common high-level languages. All current controllers are Y2K compliant or can easily have their software upgraded to a Y2K compliant version. Fortunately, these systems are fully backward-compatible with previous addressable boxes and can therefore be used with any vintage of set-top device. While a physical replacement of the old hardware platforms is a capital expense, the conversion is straightforward. Perhaps of equal benefit, the upgrade serves the interest of the vendor in the sense that their support responsibility becomes more effective if all of their customers are using the same hardware/software version. For this reason, many, if not most, of the addressable vendors are providing the software upgrade without any cost beyond the hardware upgrade. Again, since these new hardware platforms use standard personal computers, these costs are modest.

Customer Care Systems

Customer Care is the category for devices used to provide billing and account maintenance functions, as well as scheduling service installation, disconnection, and service repair calls.

As a result of discussions with leading manufacturers of these systems, we remain highly confident that Y2K compliant upgrades for billing and appointment scheduling application software, as well as for their associated hardware and operating systems will be available. In addition, these manufacturers have indicated that adequate resources will be in place to install and test these changes for the cable system in time to avert any service disruptions to our customer.

These Customer Care systems also interface with Automated Response Unit (ARU) systems for receiving service orders, as well as to set-top addressable controllers for channel authorizations and television schedule downloads. We do not anticipate that the Y2K upgrades to Customer Care systems will affect the performance of these interfaces; however, we feel that interoperability testing with both the ARU manufacturers and the addressable set-top controller manufacturers is appropriate.

Plant Devices

For the most part, there is little automated equipment in the cable distribution system itself. Signal amplifiers are not equipped with processing devices that would be aware of the time or date.

In some systems, amplifiers have been equipped with telemetry devices that send a 'status report' back to the cable system for monitoring and troubleshooting purposes. In these systems, the intelligence is located at the monitoring end. These generally run on PCs with proprietary application software, but common operating systems. Most of these systems simply generate reports about the condition of the system. Some, however, actually automate all or part of a restoration plan. Even in those systems, the cable distribution plant would continue to operate properly and there would be no disruption to our customers if the monitoring systems were to fail.

Test Equipment

Test equipment is one of the areas of lowest risk. Along with the distribution plant itself, little of the critical test equipment is automated. While some utilize time and/or date functionality, they do so primarily to log test results or schedule periodic tests. We are not aware of any cases where the failure of test equipment would result in a service interruption to our customer.

In a related area, however, there is a commonality between test equipment and the monitoring equipment described in the Plant section above. Some cable systems use a combination of monitoring and test equipment to foreshorten the time it takes to locate the source of a naturally-occurring (i.e., not Y2K-related) outage. For example, one of the primary functions of a telemetry system is to detect and report the impending failure of an amplifier or power supply. Other components of status monitoring might help locate the exact point in a system where the signal is disrupted, perhaps by an automobile accident with a utility pole, or a street construction crew that cuts a fiber feed. The outages that result from such accidents or failures would then be extended by the extra time that it would take to locate the problem manually. Realistically, such failures are rare and not a major cause of system failure.

Institutional Networks

Institutional Networks (I-Nets) are communication networks installed and usually maintained by the cable operator for the benefit of the local community or franchise authority. In reality, most of these networks are really just two-way cable systems where the end users provide and maintain their own terminating equipment. In these cases, then, the cable operator's only responsibility is maintaining the cable and amplifiers. Few of these systems have cable-provided programming, services, or equipment that would have any Y2K considerations.

For these reasons, CableLabs' effort to date has not focused on I-Nets. It may be significant to note that none of the Working Group members or vendors has provided any anecdotal evidence that there might be Y2K issues associated with I-Nets. I-Nets will, however, be a subject of future CableLabs Working Group meetings.

Other Equipment

There are a large number of "external" systems that could affect a cable system's normal operation. Examples of these include, but certainly are not limited to, package and freight delivery systems, HVAC devices, elevators, security alarms, and many others. As with any other communications media, failure of any combination of these will cause inconvenience and perhaps discomfort to system employees, but they are not expected to disrupt service to our customers.

Next Steps

Addressable Set-Top Controllers, ARUs, and Customer Care Systems play a key role in delivering cable television services. Therefore, NCTA and CableLabs intend jointly to fund a series of interoperability tests to verify their Year 2000 interoperability performance. We intend to conclude these tests this calendar year, at which time results would be made available to the industry. In addition, the funding would include the development of a generic contingency plan that would also be made available to the industry.

In addition to the testing activity, a number of additional activities are being undertaken, including:

- Presentation of Year 2000 issues and information at industry trade shows, forums and conferences, including the NCTA State Leadership Conference, the Western Cable show, the Texas Cable show, and Cable 99. We will also continue strongly to encourage the smaller state and regional shows to include Year 2000 sessions on their agendas.
- Additions to the NCTA Year 2000 website including: a generic Year 2000 test plan specific to the cable industry; information related to the Year 2000 Information and Readiness Disclosure Act; and additional links and updates to the "Coming Up" section.
- Distribution of a letter to NCTA members addressing the recent Year 2000 Information and Readiness Disclosure Act.
- Continuation of the active role of CableLabs' Y2K Working Group to share information about Y2K fixes and testing.
- Formulation and distribution of customer education materials that can be used to explain to our customers what we are doing and how to contact us in case there are any problems.

In conclusion, our goal is to take every possible step to preserve the delivery of services, to send out correct bills, to process payments correctly, and to schedule and complete any trouble calls that might arise. While it is our sincere hope that we will not have any problems arise, we recognize the importance of preparing contingency plans.

I hope this information has been helpful. We appreciate your leadership and look forward to working with you to make sure that the Year 2000 occurs smoothly without service disruptions. Should you have any questions or seek additional information, please contact me at 202.775.3637 or electronic mail at ascott@ncta.com.

Sincerely,
Andy Scott
Director of Engineering

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